MATHEMATICS SPM 2012

This module aims to prepare the Form five students for the SPM examination and also for the Form four students to reinforce as well as to enable them to master the selected topics. It also serves as a guidance for effective acquisition of the various mathematical skills.

At the end of each topic, sample answers are given. Discussions on common mistakes that result in the students' failure to obtain full mark are included as well. This module suggests specific strategies for each chosen topic and strategies which can help the students in problem solving. It is hoped that this module can benefit all the Pahang students as well as helping them towards achieving excellent results in SPM Mathematics.

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FORMAT OF ASSESSMENT INSTRUMENT
MATHEMATICS 1449

NO	TOPIC	PAPER 1 (1449/1)	PAPER 2 (1449/2)
1	Instrument type	Objective questions	Subjective questions
2	Item type	Multiple Choice Questions	Open ended structure and limited response
3	Number of Questions	40 questions (answer all)	Section A 11 questions (answer all) Section B 5 questions (choose 4)
4	Total Marks	40	Section A Total marks : 52 Section B Total marks : 48 (Each question 12 marks) Overall Total :100
5	Test Duration	1 hour 15 minutes	2 hours 30 minutes
6	Constructs Weights	Knowledge - 45% Skills - 55%	Knowledge - 25% Skills - 70% Values - 5%
7	Context Scope	▪ Lower secondary school scope with continuation in the upper secondary. ▪ All aspects of learning from Form 4 and Form 5.	▪ Lower secondary school scope with continuation in the upper secondary. ▪ All aspects of learning from Form 4 and Form 5.
8	Difficulty level Low - L Medium - M High - H	L : M : H = 5 : 3 : 2	L : M : H = 5 : 3 : 2
9	Additional Tools	a. Scientific Calculator b. Four-figure Mathematical table b. Geometry Set	a. Scientific Calculator b. Four-figure Mathematical table b. Geometry Set

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2. LIST OF MATHEMATICS TOPICS 1449

No.	FORM 1 – 3	FORM 4	FORM 5
1	Circles I and II	Standard Form	Number Bases
2	Polygons I and II	Quadratic Expressions and Equations	Graphs of Functions II
3	Solids and Volumes	Sets	Transformations III
4	Transformations I and II	Mathematical Reasoning	Matrices
5	Trigonometry I	The Straight Line	Variations
6	Algebraic Expressions I and II	Statistics III	Gradient and Area under a Graph
7	Algebraic fractions	Probability I	Probability II
8	Algebraic Formulae	Circles III	Bearing
9	Linear Equations(1 and 2 unknowns)	Trigonometry II	Earth as a Sphere
10	Indices	Angles of Elevation and Depression	Plans and Elevations
11	Linear Inequalities	Lines and Planes in 3 Dimensions	
12	Statistics I and II		
13	Arc Length & Area of Sector		

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TOPICAL ANALYSIS OF SPM MATHEMATICS PAPER 1

Bil	TOPIC	FORM	2004	2005	2006	2007	2008	2009	2010	2011
1	**Standard Form**	4	1,2,3,4	1,2,3	1,2,3,4	1,2,3	1,2,3,4	1,2,3,4	1,2,3,4	1,2,3,4
2	Number Bases	5	5,6	4,5	5,6	4,5	5,6	5,6	5,6	5,6
3	Polygon II	3	7	6,7	7	6,7	7	7,8	7,8	7
4	Circles III	4	8	8	8	8	8	9	9	8
5	**Transformation I**	3	9,10.	9,10	9,10	9,10	9,10	10,11	10,11	9,10
6	Trigonometry I	3	13	-	11	-		12	12	-
7	**Trigonometry II**	4	11,12	11,12,13	12,13	11,12,13	11,12,13	13	13	11,12, 13
8	Lines and Planes in 3 Demension	4	14	14	14	14	14	14	14	14
9	Angles of Elevation and Depression	4	15,16	15	15,16	15	15	15,16	15	15
10	Bearing	5	18	16	17	16	16,17	17	16,17	16,17
11	Earth as a Sphere	5	17	17,18	18	17,18	18	18	18	18
12	Algebraic Expression II	2	20	19	19.20	19	19	19	19	19
13	Algebraic Expression III	3	19	20	-	21	20	20	20	20
14	Algebraic Formulae	3	21	21	21	20	21	21	21	21
15	Linear Equation I	2	22	22	22	22	22	22	22	22
16	**Indices**	3	23,24	23,24	23	23,24	23,24	23,24	23,24	23,24
17	**Linear Inequalities**	3	25,26	25	24	25		25,26	25,26	25
18	Statistic I	2	27	27	26,27	26	25	27	27	26
19	Statistic II	3	28		25	27	26,27	28	28	27
20	Statistic III	4	-	26	-	-	-	29	29	-
21	Graph of Function II	5	29	28	28	28	-	30	30	28
22	**Sets**	4	30,31,32	29,30,31	29,30,31	29,30,31	29,30,31	30,31	31,32	29,30, 31
23	**The Straight Line**	4	33,34	32,33	32,33	32,33	32,33	33,34	33,34	32,33
24	**Probability I**	4	35,36,37	34,35	34,35	34,35	34,35	35,36	35,36, 37	34,35
25	**Variations**	5	38,39	36,37,38	36,37,38	36,37,38	36,37,38	37,38	38	36,37, 38
26	**Matrices**	5	40	39,40	39,40	39,40	39,40	39,40	39,40	39,40

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No.	Form	Topic	2005	2006	2007	2008	2009	2010	2011
		PART A (QUESTION 1 TO QUESTION 11							
1.	1-3	**Simultaneous Linear Equations**	1	1	1	1	**(Q3)**	**Q4**	**Q2**
2	4	**Quadratic Equation**	1	1	1	1	**(Q2)**	**Q3**	**Q3**
3	4	**Sets** (Shade Venn diagrams)	-	1	-	1		**Q1**	**Q1**
	5	**Region for Inequalities**	1	-			**(Q1)**	-	-
4.	4	**Mathematical Reasoning** (Statement, implications, argument, mathematical induction, converse)	1	1	1	1	**Q(5)**	**Q6**	**Q5**
5.	4	The Straight Line (parallel, equation,y-intercept)	1	1	1	1	**(Q6)**	**Q7**	**Q6**
6.	5	Probability II	1	1	1	1	**(Q9)**	**Q8**	**Q10**
7.	1-3	**Arc Length & Area of Sector**	1	1	1	1	**(Q10)**	**Q9**	**Q9**
8.	1-3	**Volume of Solids**							
		a. cuboid and half cylinders	-			1			**Q7**
		b. Cubes and Cylinders	1	-				**Q5**	
		c. Cones and cuboids							
		d. Pyramid and prism		1	1				
		e. Cones and hemisphere					**(Q8)**		
9.	5	**Matrices (Inverse, matrix equation)**	1	1	1	1	**(Q7)**	**Q11**	**Q8**
10.	5	**Gradient and Area Under a Graph**							
		a. Speed-Time Graph	1	1	1	1	**(Q11)**	**Q10**	**Q11**
		b. Distance-Time graph	-	-	1				
11.	4	Lines & Planes in 3 Dimensions (angle between 2 planes)	1	1	1	1	**(Q4)**	**Q2**	**Q4**
		PART B (QUESTION 12 TO QUESTION 16 CHOOSE ANY FOUR							
12.	5	**Graphs of Functions II**							
		a. Quadratic	1	1				**Q12**	
		b. Cubic	-	-	1		**(Q12)**		**Q12**
		c. Reciprocal	-	-		1			
13.	5	**Transformations III (combined)**	1	1	1	1	**(Q13)**	**Q13**	**Q13**
14.	5	**Earth as a Sphere**	1	1	1	1	**(Q16)**	**Q16**	
15.	5	**Plans and elevations**							
		a. Prism and cuboids					**(Q15)**	**Q15**	**Q15**
		b. Cuboids and half cylinder, prism	1	-	1				
		c. Prism and prism	-	1		1			
16.	4	**Statistics III**							
		a. Raw data, frequency table, mean, frequency polygon, modal class	1	1	1	1	**(Q14a)**	**Q14a**	
		b. Ogive	-	-	1			**Q14b**	
		c. Histogram	1	1			**(Q14b)**		**Q14**
		d. Frequency Polygon	-	-		1			
		e. Communication	1	-		1	**(Q14c)**	**Q14c**	**Q14e**
Total Questions			**16**	**16**	**16**	**16**	**16**	**16**	

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TOPICAL ANALYSIS OF SPM MATHEMATICS PAPER 2

Question Allocation (Mathematics SPM 2007)

Form	Number of questions					
	Paper 1	**%**	**Paper 2**	**Marks**	**%**	**Total %**
1-3	13	32.5	3	14	12.50	28.57
4	16	40.0	6	33	29.46	39.28
5	11	27.5	7	65	58.04	32.14
Total	40	100.00	16	112	100.00	100.00

Question Allocation (Mathematics SPM 2008)

Form	Number of questions					
	Paper 1	**%**	**Paper 2**	**Marks**	**%**	**Total %**
1-3	12	30.00	3	14	12.50	18.75
4	19	47.50	6	33	29.46	40.98
5	09	22.50	7	65	58.04	40.27
Total	40	100.00	16	112	100.00	100.00

Question Allocation (Mathematics SPM 2009)

Form	Number of questions					
	Paper 1	**%**	**Paper 2**	**Marks**	**%**	**Total %**
1-3	15	37.50	3	14	12.50	18.75
4	16	40.00	6	33	29.46	40.98
5	09	22.50	7	65	58.04	40.27
Total	40	100.00	16	112	100.00	100.00

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Question Allocation (Mathematics SPM 2010)

Form	Number of questions					
	Paper 1	**%**	**Paper 2**	**Marks**	**%**	**Total %**
1-3	15	37.50	3	14	12.50	18.75
4	16	40.00	6	33	29.46	40.98
5	09	22.50	7	65	58.04	40.27
Total	40	100.00	16	112	100.00	100.00

Question Allocation (Mathematics SPM 2011)

Form	Number of questions					
	Paper 1	**%**	**Paper 2**	**Marks**	**%**	**Total %**
1-3	15	37.50	3	14	12.50	18.75
4	16	40.00	6	33	29.46	40.98
5	09	22.50	7	65	58.04	40.27
Total	40	100.00	16	112	100.00	100.00

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SIMULTANEOUS LINEAR EQUATIONS
PENYELESAIAN PERSAMAAN SERENTAK

1 Calculate the values of x and y that satisfy the following simultaneous linear equations:
Hitungkan nilai x dan y yang memuaskan persamaan linear serentak berikut:

$$x - 2y = 7$$
$$2x + y = 4$$

Answer/*Jawapan*:

2 Calculate the values of h and k that satisfy the following simultaneous linear equations:
Hitungkan nilai h dan k yang memuaskan persamaan linear serentak berikut:

$$h + 3k = 1$$
$$3h - 2k = -8$$

Answer/*Jawapan*:

3 Calculate the values of g and h that satisfy the following simultaneous linear equations:
Hitungkan nilai g dan h yang memuaskan persamaan linear serentak berikut:

$$g + 3h = -18$$
$$\frac{2}{3}g - h = -1$$

Answer/*Jawapan*:

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4 Calculate the values of x and y that satisfy the following simultaneous linear equations:
Hitungkan nilai x dan y yang memuaskan persamaan linear serentak berikut:

$$3x + \frac{1}{2}y = 11$$
$$2x - y = 10$$

Answer/*Jawapan*:

5 Calculate the values of p and q that satisfy the following simultaneous linear equations:
Hitungkan nilai p dan q yang memuaskan persamaan linear serentak berikut:

$$p - 4q = 1$$
$$\frac{1}{3}p + 2q = 7$$

Answer/*Jawapan*:

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SKEMA JAWAPAN

Question	Solution and Mark Scheme	Marks
1	$2x-4y=14$ *or* $4x+2y=8$ *or* equivalent	1
	Note Attempt to equate the cooficence one the unknowns, award K1	
	$-5y=10$ *or* $5x=15$ *or* equivalent	1
	OR	
	$x=7+2y$ *or* $y=\frac{x-7}{2}$ *or* equivalent (1) $5y=-10$ *or* $5x=15$ *or* equivalent (1)	
	OR	
	$\begin{pmatrix}x\\y\end{pmatrix}=\frac{1}{(1\times1)-(-2\times2)}\begin{pmatrix}1&2\\-2&1\end{pmatrix}\begin{pmatrix}7\\74\end{pmatrix}$ *or* equivalent (2)	
	$x=3$	1
	$y=-2$	1 **4**
	Note: $\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}3\\-2\end{pmatrix}$ as final answer, award 1	

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Question	Solution and Mark Scheme	Marks
2	$3h+9k=3$ *or* equivalent	1
	Note Attempt to equate the cooficence one the unknowns, award K1	
	$-11k=-11$ *or* $11h=-22$ *or* equivalent	1
	OR	
	$h=1-3k$ *or* $k=\frac{1-h}{3}$ *or* equivalent *or* $h=\frac{-8+2k}{3}$ *or* $k=\frac{8+3h}{2}$	(1)
	Note Attempt to make the one the unknowns as the subject, award K1	
	$-11k=-11$ *or* $11h=-22$ or equivalent	(1)
	OR	
	$\begin{pmatrix}h\\k\end{pmatrix}=\frac{1}{(1\times(-2)-(3\times3)}\begin{pmatrix}-2 & -3\\-3 & 1\end{pmatrix}\begin{pmatrix}1\\-8\end{pmatrix}$ *or* equivalent	(2)
	$h=-2$	1
	$k=1$	1 **4**
	Note: $\begin{pmatrix}h\\k\end{pmatrix}=\begin{pmatrix}-2\\1\end{pmatrix}$ as final answer, award 1	

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Question	Solution and Mark Scheme	Marks
3	$2g-3h=-3$ *or* $\frac{2}{3}g+2h=-12$ *or* equivalent	1
	Note Attempt to equate the cooficence one the unknowns, award K1	
	$3g=-21$ *or* $-3h=-11$ *or* equivalent	1
	OR	
	$g=-3h-18$ *or* $h=\frac{2}{3}g+1$ *or* $h=\frac{-18-g}{3}$ *or* equivalent (1)	
	Note Attempt to make the one the unknowns as the subject, award K1	
	$-3h=11$ *or* $3g=-21$ *or* equivalent (1)	
	OR	
	$\begin{pmatrix} g \\ h \end{pmatrix}=\frac{1}{(1\times(-1)-(3\times\frac{2}{3})}\begin{pmatrix} -1 & -3 \\ -\frac{2}{3} & 1 \end{pmatrix}\begin{pmatrix} -18 \\ -1 \end{pmatrix}$ *or* equivalent (2)	
	$g=-7$	1
	$h=-\frac{11}{3}$	1 **4**
	Note:	
	$\begin{pmatrix} g \\ h \end{pmatrix}=\begin{pmatrix} -7 \\ -\frac{11}{3} \end{pmatrix}$ as final answer, award 1	

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Question	Solution and Mark Scheme	Marks
4	$6x + y = 22$ *or* $x - \frac{1}{2}y = 5$ *or* equivalent	1
	Note Attempt to equate the cooficence one the unknowns, award K1	
	$4x = 16$ *or* $8x = 32$ *or* equivalent	1
	OR	
	$x = \frac{11}{3} - \frac{1}{6}y$ *or* $y = 22 - 6x$ *or* equivalent (1)	
	Note Attempt to make the one the unknowns as the subject, award K1	
	$\frac{-4}{3}y = \frac{8}{3}$ *or* $8x = 32$ *or* equivalent (1)	
	OR	
	$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{(3\times(-1)) - (\frac{1}{2}\times 2)} \begin{pmatrix} -1 & -\frac{1}{2} \\ -2 & 3 \end{pmatrix} \begin{pmatrix} 11 \\ 10 \end{pmatrix}$ *or* equivalent (2)	1
	$x = 4$	1
	$y = -2$	1 **4**
	Note: $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ as final answer, award 1	

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Question	Solution and Mark Scheme	Marks
5	$p+6q=21$ *or* $\frac{1}{3}p-\frac{4}{3}q=\frac{1}{3}$ *or* equivalent	1
	Note Attempt to equate the cooficence one the unknowns, award K1	
	$-10q=-20$ *or* $\frac{10}{3}q=\frac{20}{3}$ *or* equivalent	1
	OR	
	$p=4q+1$ *or* $q=\frac{p-1}{4}$ *or* equivalent (1)	
	Note Attempt to make the one the unknowns as the subject, award K1	
	$\frac{10}{3}q=\frac{20}{3}$ *or* $\frac{5}{6}p=\frac{15}{2}$ *or* equivalent (1)	
	OR	
	$\begin{pmatrix}p\\q\end{pmatrix}=\frac{1}{(1\times2)-(-4\times\frac{1}{3})}\begin{pmatrix}2 & 4\\ -\frac{1}{3} & 1\end{pmatrix}\begin{pmatrix}1\\7\end{pmatrix}$ *or* equivalent (2)	
	$p=9$	1
	$q=2$	1 **4**
	Note: $\begin{pmatrix}p\\q\end{pmatrix}=\begin{pmatrix}9\\2\end{pmatrix}$ as final answer, award 1	

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QUADRATIC EQUATION
PERSAMAAN KUADRATIK

1. Solve the following quadratic equation:
Selesaikan persamaan kuadratik berikut:

$$2p^2 = 3(3 + p)$$

2. Solve the following quadratic equation:
Selesaikan persamaan kuadratik berikut:

$$x^2 - 2 = \frac{11x - 5}{4}$$

3. Solve the following quadratic equation:
Selesaikan persamaan kuadratik berikut:

$$4x\left(x + \frac{1}{4}\right) = 18$$

4. Solve the following quadratic equation:
Selesaikan persamaan kuadratik berikut:

$$(y - 2)(y - 6) = 3(y - 2)$$

5. Solve the following quadratic equation:
Selesaikan persamaan kuadratik berikut:

$$h = \frac{7 - 6h}{h}$$

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ANSWER / *JAWAPAN*

	Answer / *Jawapan*	Mark / Markah
1.	$2p^2 - 3p - 9 = 0$ $(2p + 3)(p - 3) = 0$ $p = -\frac{3}{2}, 3$	1 1 1, 1 **4**
2.	$4x^2 - 11x - 3 = 0$ $(4x + 1)(x - 3) = 0$ $x = -\frac{1}{4}, 3$	1 1 1, 1 **4**
3.	$4x^2 + x - 18 = 0$ $(4x + 9)(x - 2) = 0$ $x = -\frac{9}{4}, 2$	1 1 1, 1 **4**
4.	$y^2 - 11y + 18 = 0$ $(y - 9)(y - 2) = 0$ $x = 9,2$	1 1 1, 1 **4**
5.	$h^2 + 6h - 7 = 0$ $(h + 7)(h - 1) = 0$ $h = -7,1$	1 1 1, 1 **4**

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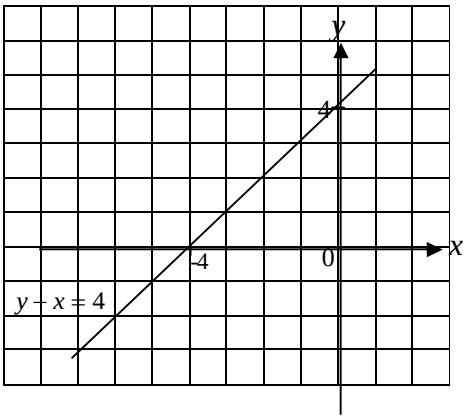
INEQUALITIES
KETAKSAMAAN

1 On the graph in the answer space, shade the region which satisfy the three inequalities $y - x \le 4$, $y > -2$, and $x \le 0$.

Pada graf di ruang jawapan,lorekkan rantau yang memuaskan ketiga-tiga ketaksamaan $y - x \le 4$, $y > -2$, *dan* $x \le 0$.

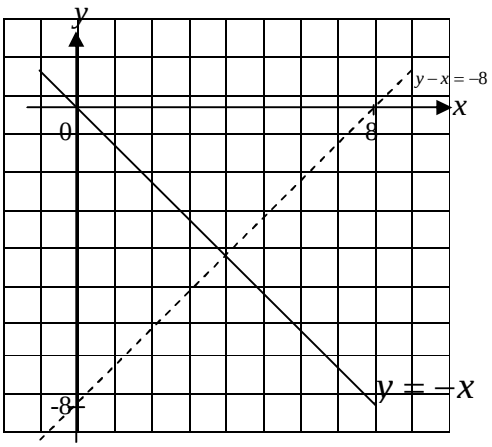
Answer/*Jawapan*:



2 On the graph in the answer space, shade the region which satisfy the three inequalities $x < 8$, $y \ge -x$ and $y - x < -8$.

Pada graf di ruang jawapan,lorekkan rantau yang memuaskan ketiga-tiga ketaksamaan $x < 8$, $y \ge -x$ *dan* $y - x < -8$

Answer/*Jawapan*:



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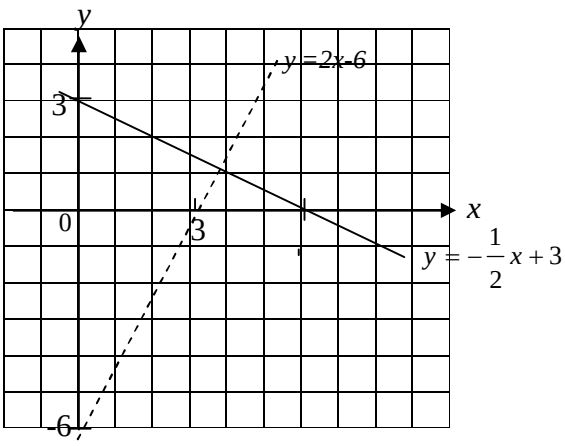
3 On the graph in the answer space, shade the region which satisfy the three inequalities

$y < 2x - 6$, $y \leq \frac{1}{2}x + 3$ and $y \geq 0$

Pada graf di ruang jawapan,lorekkan rantau yang memuaskan ketiga-tiga ketaksamaan

$y < 2x - 6$, $y \leq -\frac{1}{2}x + 3$ *dan* $y \geq 0$

Answer/*Jawapan*:



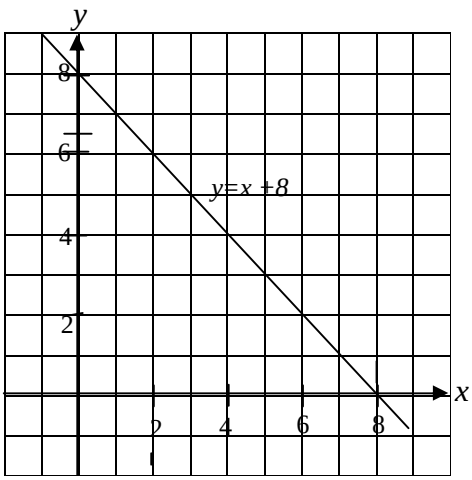
4 On the graph in the answer space, shade the region which satisfy the three inequalities

$y + x \leq 8$, $y < 2x$ and $y \geq 2$

Pada graf di ruang jawapan,lorekkan rantau yang memuaskan ketiga-tiga ketaksamaan

$y + x \leq 8$, $y < 2x$ *dan* $y \geq 2$

Answer/*Jawapan*:



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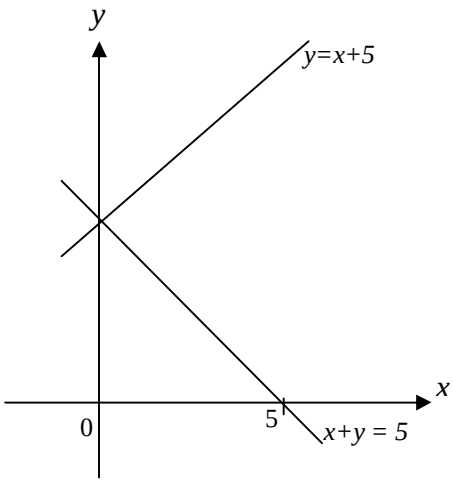
5 On the graph in the answer space, shade the region which satisfy the three inequalities $y =\leq x+5$, $x \leq 5$ and $y+x \geq 5$

Pada graf di ruang jawapan,lorekkan rantau yang memuaskan ketiga-tiga ketaksamaan $y =\leq x+5$, $x \leq 5$ *dan* $y+x \geq 5$



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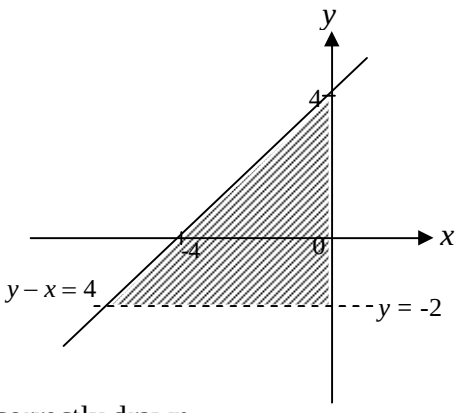
SKEMA JAWAPAN

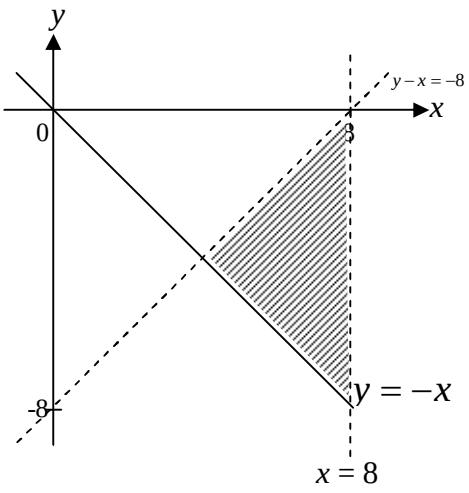
1



The line $y = -2$ correctly drawn 1

The region correctly shaded. 2 **3**

2



The line $x = 8$ correctly drawn 1

The region correctly shaded. 2 **3**

NOTE:
Award P1 to shaded region by two correct lines satisfy any two inequalities.
(Check one vertex from any two correct lines)

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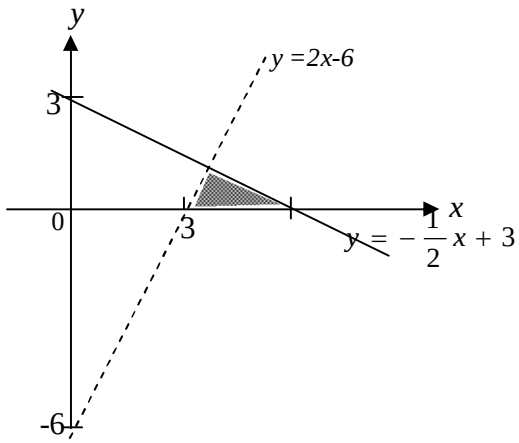
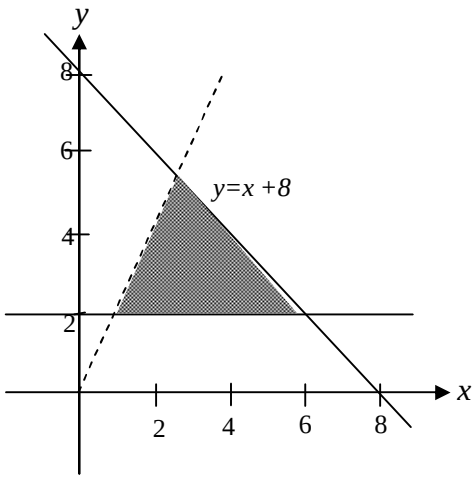
Question	Solution and Mark Scheme	Marks

3



The region correctly shaded. 3 **3**

4



The line $y = 2x$ and $y = 2$ correctly drawn 1

The region correctly shaded. 2 **3**

Note:

Award 1 to shaded region by two correct lines satisfy any two inequalities.
(Check one vertex from any two correct lines)

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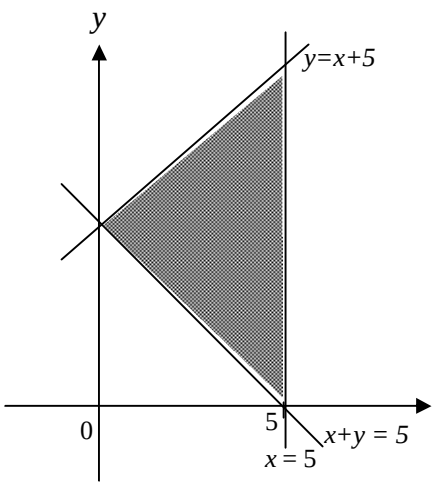
Question	**Solution and Mark Scheme**	**Marks**

5



The line $x = 5$ correctly drawn 1

The region correctly shaded. 2

Note:

Award 1 to shaded region by two correct lines satisfy any two inequalities.
(Check one vertex from any two correct lines)

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MATHEMATICAL REASONING
PENAAKULAN MATEMATIK

1. a) Determine whether the sentence is a statement or non statement
Tentukan sama ada ayat berikut suatu pernyataan atau bukan pernyataan.

(i) "$4y + 5 = 9$"

(ii) "50 is a prime number"
" 50 ialah nombor perdana

b) Complete the conclusion to the argument :
Lengkapkan kesimpulan dalam hujah yang berikut :

Premise 1 : An isosceles triangle has only one axis of symmetry.
Premis 1 : Segitiga sama kaki mempunyai hanya satu paksi simetri.

Premise 2 : *PQR* do not has any axis of symmetry.
Premis 2 : PQR tidak mempunyai paksi simetri.

Conclusion/*Kesimpulan* ……..

c) Make a general conclusion by induction to the list of the following number sequence:
Buatkan kesimpulan umum secara aruhan bagi senarai nombor berpola yang berikut:

$1 = 0 + 1$
$2 = 1 + 1$
$5 = 4 + 1$
$10 = 9 + 1$
$17 = 16 + 1$
….....

2. a) Complete the following argument :
Lengkapkan hujah berikut :

Premise 1 : All squares have four equal sides.
Premis 1: Semua sisi empat sama mempunyai empat sisi yang sama panjang.

Premise2/*Premis 2* : …….

Conclusion : *EFGH* has four equal sides.
Kesimpulan : EFGH mempunyai empat sisi yang sama panjang.

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b) Write down two implication from the sentence :
Tulis dua implikasi daripada ayat berikut :

$A \subset B$ if and only if $A \cap B = A$
$A \subset B$ *jika dan hanya jika* $A \cap B = A$

c) Make a conclusion by induction to the list of numbers 1, 10, 15, 46, … as the given sequence :
Buat satu kesimpulan secara aruhan bagi senarai nombor 1, 10, 15, 46, … yang mengikut pola yang berikut :

$1 = 3(1)^2 - 2$
$10 = 3(2)^2 - 2$
$25 = 3(3)^2 - 2$
$46 = 3(4)^2 - 2$
.....

3. a) Write down two implication from the sentence :
Tulis dua implikasi daripada ayat berikut :

$2x + 5 = 17$ if and only if $x = 6$.
$2x + 5 = 17$ *jika dan hanya jika* $x = 6$.

b) Complete the conclusion to the argument :
Lengkapkan premis dalam hujah berikut :

Premise 1 : If $\sin x = 0.5$ then $x = 30^o$
Premis 1 : Jika $\sin x = 0.5$ *maka* $x = 30^o$

Premise 2 / *Premis 2* : $\sin x = 0.5$

Conclusion/*Kesimpulan* : …….

c) Make a general conclusion by induction to the list of the following number sequence:
Buat satu kesimpulan secara aruhan bagi senarai nombor yang mengikut pola yang berikut :

$11 = 9 + 2 \times 1$
$17 = 9 + 2 \times 4$
$27 = 9 + 2 \times 9$
$41 = 9 + 2 \times 16$
.....

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4. a) Determine whether the following compound statement is true or false.
Tentukan sama ada pernyataan berikut benar atau palsu.

(i) $\cos 30^o = 0.5$ or $\tan 45^o = 1$
cos $30^o = 0.5$ *atau tan* $45^o = 1$

(ii) $\sin 60^o = 0.8660$ and $\tan 60^o = 0.5773$
sin $60^o = 0.8660$ *dan tan* $60^o = 0.5773$

b) Write down two implication from the sentence :
Tulis dua implikasi daripada ayat berikut :

"*x* is an even number if and only if *x* can be divided by 2"
" x ialah nombor genap jika dan hanya jika x boleh dibahagi dengan 2"

(a) Premise 1 / *Premis 1* : ……

Premise 2 : *p* is a prime number
Premis 2 : p ialah nombor perdana

Conclusion : *p* has only two factors
Kesimpulan : p mempunyai hanya dua faktor.

5. a) Determine whether the sentence is statement or non statement.
Tentukan sama ada ayat berikut suatu pernyataan atau bukan pernyataan

$3 + 4 = 4 + 5$

b) Write a true statement using quantifier "all" or "some"
Tulis satu pernyataan benar dengan menggunakan pengkuantiti "semua" atau "sebilangan".

(i) ……..of the side of rectangle are equal
..... sisi empat sisi sama panjang.

(ii) …….. multiple of six are multiple of three
…….. nombor gandaan enam adalah gandaan tiga

c) Write the converse of the followi g statement. Hence, state whether the converse is true or false.
Tuliskan akas bagi pernyataan berikut. Seterusnya, nyatakan sama ada akas itu benar atau palsu.

"If *x* is a factor of 12 then 12 is a multiple of *x*"
"Jika x ialah faktor bagi 12 maka 12 ialah gandaan bagi x"

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ANSWER / JAWAPAN

	Answer / *Jawapan*	Mark / Markah
1.	(a) (i) non-statement (ii) statement (b) Conclusion : PQR is not an isósceles (c) $n^2 + 1$, n = 0, 1, 2, 3, 4, …	1 1 1 2 **5**
2.	(a) Premise 2 : EFGH is a square (b) Implication 1 : If A $\subset$ B = A then A $\cap$ B Implication 2 : If A $\cap$ B then A $\subset$ B = A (c) $3n^2 - 2$, n = 1, 2, 3, 4, …	1 1 1 2 **5**
3.	(a) Implication 1 : if 2x + 5 = 17 then x = 6 Implication 2 : if x = 6 then 2x + 5 = 17 (b) $x = 30^o$ (c) $9 + 2n^2$, n = 1, 2, 3, 4, …	1 1 1 2 **5**
4.	(a) (i) true (ii) false (b) Implication 1 : if x is an even number then x can be divided by 2 Implication 2 : if x can be divided by 2 then x is an even number (c) All prime numbers have only two factors.	1 1 1 1 1 **5**
5.	(a) statement (b) (i) some (ii) all (c) If 12 is a multiple of x then x is a factor of 12. true	1 1 1 1 1 **5**

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STRAIGHT LINE / *GARIS LURUS*

1. Diagram 1 shows a parallellogram PRST and O is the origin.
Rajah 1 menunjukkan segiempat selari PRST dan O ialah asalan.

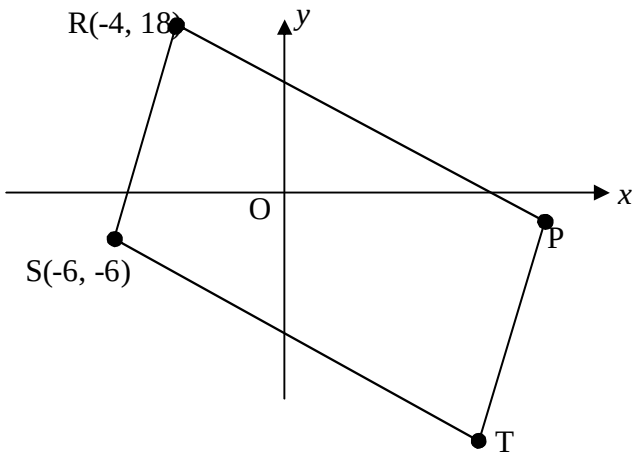

Diagram 1 /
Rajah 1

The gradient of straight line PR is -3.
Kecerunan garis lurus PR ialah -3.
Find / *Carikan*
a) the equation of straight line PR
persamaan garis lurus PR
b) *x*-intercept of straight line TS.
pintasan-x bagi garis lurus TS.

2. Diagram 2 shows a trapezium OABC. Given the gradient OC is $\frac{1}{3}$, AB parallel to OC and O is the origin.
Rajah 2 menunjukkan sebuah trapezium OABC. Diberi kecerunan garis lurus OC ialah $\frac{1}{3}$, *AB selari dengan OC dan O ialah asalan.*

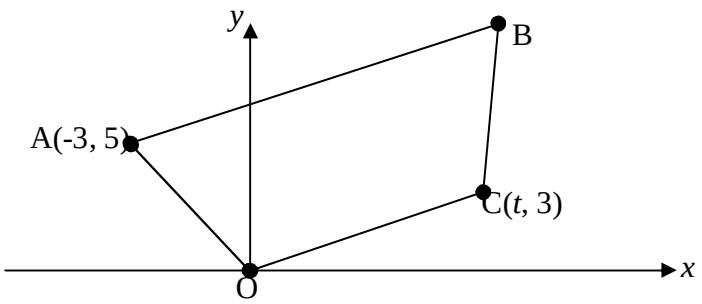

Diagram 2 /
Rajah 2

a) Find the value of *t*.
Carikan nilai t.

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b) Find the equation of straight line AB, hence, state the *x*-intercept of the straight line.
Carikan persamaan garis lurus AB dan seterusnya, nyatakan pintasan-x bagi garis lurus itu.

3. In Diagram 3, PQ is parallel to MN. Point O is the origin.
Dalam Rajah 3, PQ adalah selari dengan MN. Titik O ialah asalan.

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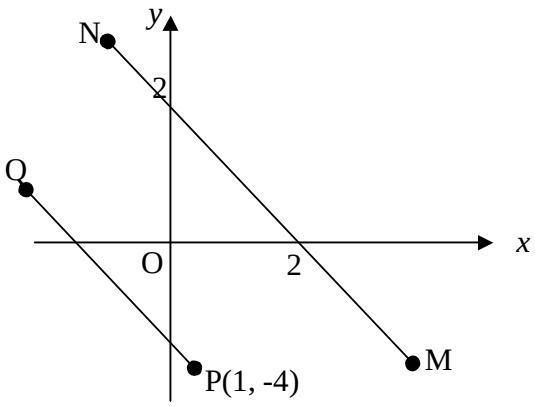

Diagram 3 /
Rajah 3

Find / *Carikan*
a) gradient of PQ
kecerunan PQ
b) the equation of straight line MN
persamaan garis lurus MN
c) y-intercept of straight line PQ
pintasan-y bagi garis lurus PQ

4. In Diagram 4, *LP* is parallel to *x*-axis. P lies on the *y*-axis. *PQ* is parallel to *LM*. The equation of straight line *LM* is $2y + 3x = -12$.
Dalam Rajah 4, LP adalah selari dengan paksi-x. P terletak di atas paksi-y. PQ adalah selari dengan LM. Persamaan garis lurus LM ialah $2y + 3x = -12$.

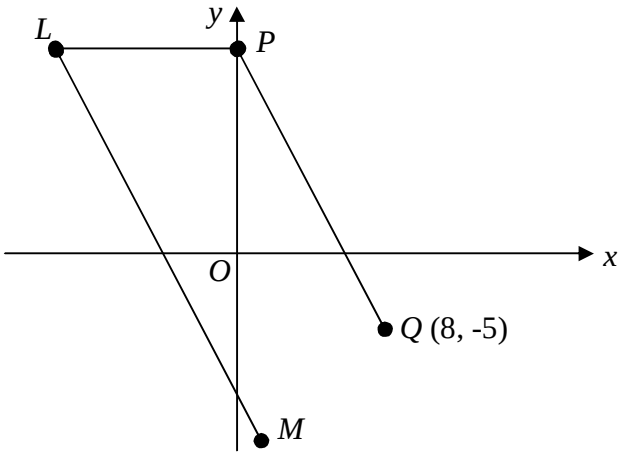

Diagram 4 /
Rajah 4

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(a) State the equation of straight line *LP*
Nyatakan persamaan garis lurus LP

(b) Find the equation of straight line *PQ*, hence, state the *x*-intercept of straight line .
Cari persamaan garis lurus PQ dan seterusnya, nyatakan pintasan – x bagi garis lurus itu.

5. In Diagram 5, *O* is an origin. Point *R* lies on the *y*-axis and point *P* lies on the *x*-axis. Straight line *PU* is parallel to the *y*-axis and straight line *PR* are parallel to the straight line *ST*. The equation of the straight line *PR* is $y - 2x = -8$.
Dalam Rajah 5, *O ialah asalan. Titik R terletak pada paksi-y dan titik P terletak pada paksi-x. Garis lurus PU adalah selari dengan paksi-y dan garis lurus PR adalah selari dengan garis lurus ST. Persamaan garis lurus PR ialah* $y - 2x = -8$.

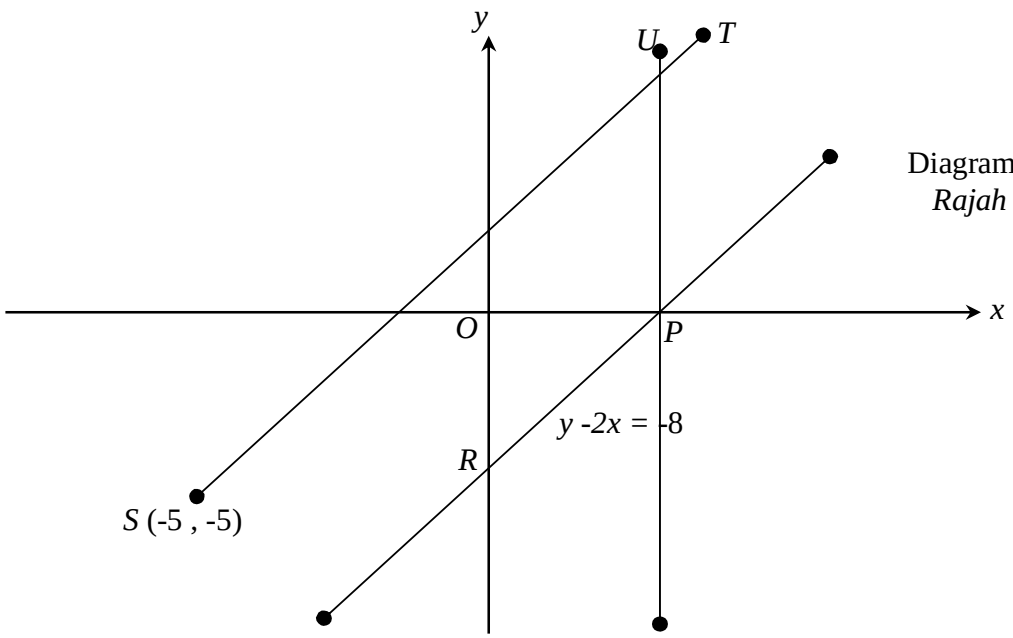

Diagram 5 /
Rajah 5

(*a*) State the equation of the straight line *PU*.
Nyatakan persamaan garis lurus PU.

(*b*) Find the equation of the straight line *ST* and hence, state the *y*-intercept of the straight line.
Carikan persamaan garis lurus ST dan seterusnya, nyatakan pintasan-y bagi garis lurus itu.

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ANSWER / *JAWAPAN*

	Answer / *Jawapan*	**Mark / *Markah***
1.	(a) $18 = -3(-4) + c$ or $c = 6$ $y = -3x + 6$ (b) $m_{ST} = m_{PR} = -3$ $-6 = -3(-6) + c$ or $c = -24$ $y = -3x - 24$	1 1 1 1 1 **5**
2.	(a) $\frac{3-0}{t-0} = \frac{1}{3}$ $t = 9$ (b) $5 = \frac{1}{3}(-3) + c$ or $c = 6$ $y = \frac{1}{3}x + 6$ $0 = \frac{1}{3}x + 6$ $x = -18$	1 1 1 1 1 **6**
3.	(a) $m_{PQ} = m_{MN} = -1$ (b) $2 = -1(0) + c$ or $c = 2$ $y = -x + 2$ (c) $-4 = -(1) + c$ *y-intercept* $= -3$	1 1 1 1 1 **5**
4.	(a) $m_{PQ} = m_{LM} = -\frac{3}{2}$ $-5 = -\frac{3}{2}(8) + c$ or $c = 7$ $y = 7$ (b) $y = -\frac{3}{2}x + 7$ *x-intercept* $= \frac{14}{3}$	1 1 1 1 1 **5**
5.	(a) $0 - 2x = -8$ $x = 4$	1 1

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	(b) $m_{ST} = m_{PQ} = 2$ or $c = 5$ $y = 2x + 5$ *y-intercept* $= 5$	1 1 1	**5**

PROBABILITY
KEBARANGKALIAN

1. Five balls labeled H, O, U, S and E are put into a bag. One ball is chosen at random from the bag. If the ball is a vowel, the ball is put back into the bag before the second ball is taken out randomly. Find the probability that:
Lima biji bola berlabel H, O, U, S dan E dimasukkan ke dalam sebuah beg. Sebiji bola dipilih secara rawak dari beg itu. Jika label pada bola yang dipilih itu ialah huruf vokal, bola itu dimasukkan semula ke dalam beg sebelum bola kedua dipilih secara rawak dari beg tersebut. Carikan kebarangkalian bahawa :

   (i) two balls labeled with a vowel to be taken out respectively.
   dua biji bola berlabel huruf vokal dipilih secara berturut-turut,

   (ii) one ball is labeled with a vowel and the other ball is labeled with a consonant.
   Satu bola dilabel dengan huruf vokal manakala satu lagi bola di label dengan huruf konsonan.

2.

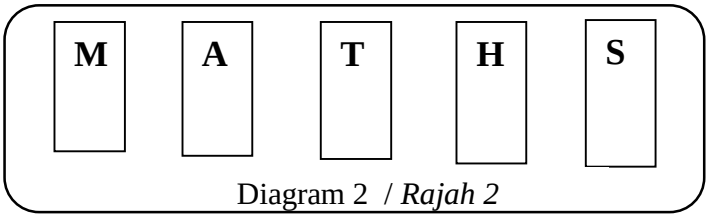

Diagram 2 / *Rajah 2*

Five cards labeled as in diagram 2 are put in a box. Two cards are taken out from the box randomly.
Lima keping kad huruf seperti dalam rajah 2 dimasukkan ke dalam sebuah kotak. Dua keping kad dikeluarkan secara rawak daripada kotak itu.
By listing the sample space, find the probability that
Dengan menyenaraikan ruang sampel, cari kebarangkalian bahawa
(a) one of the card is marked M
Salah satu kad bertanda M.

(b) a card marked M or a card marked H.
Sekeping kad bertanda M atau sekeping kad bertanda H.

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3. Diagram 3 shows a dart board numbered 2, 4, 6 and 9.
Rajah 3 menunjukkan sebuah papan dart bertanda 2, 4, 6 dan 9.

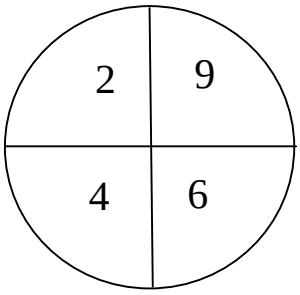

Diagram 3 / *Rajah 3*

A boy tossed a coin and then throw a dart onto a board as shown in diagram 3.
Seorang budak lelaki melambung sekeping duit syiling dan kemudian membaling dart ke papan dart seperti dalam rajah 3.

By listing the sample space of all the possible outcomes, find the probability that
Dengan menyenaraikan ruang sampel bagi semua kesudahan yang mungkin, cari kebarangkalian

(a) tail and multiple of 2 are obtained.

Angka dan gandaan 2 diperoleh.

(b) Head or perfect square are obtained.

Gambar atau nombor kuasa dua sempurna diperoleh.

4. (a) Box A contains a red(R) ball, a yellow(Y) ball and a green(G) ball. Box B also contains a red(R) ball, a yellow(Y) ball and a green(G) ball. A ball is drawn randomly from box A and a ball is picked randomly from box B.
Kotak A mengandungi satu bola merah(R), satu bola kuning(Y) dan satu bola hijau(G). Kotak B juga mengandungi satu bola merah(R), satu bola kuning(Y) dan satu bola hijau(G). Satu bola diambil secara rawak daripada kotak A dan satu bola diambil secara rawak daripada kotak B.

(a) Complete the possible outcomes in diagram 4.
Lengkapkan kesudahan yang mungkin dalam Rajah 4.

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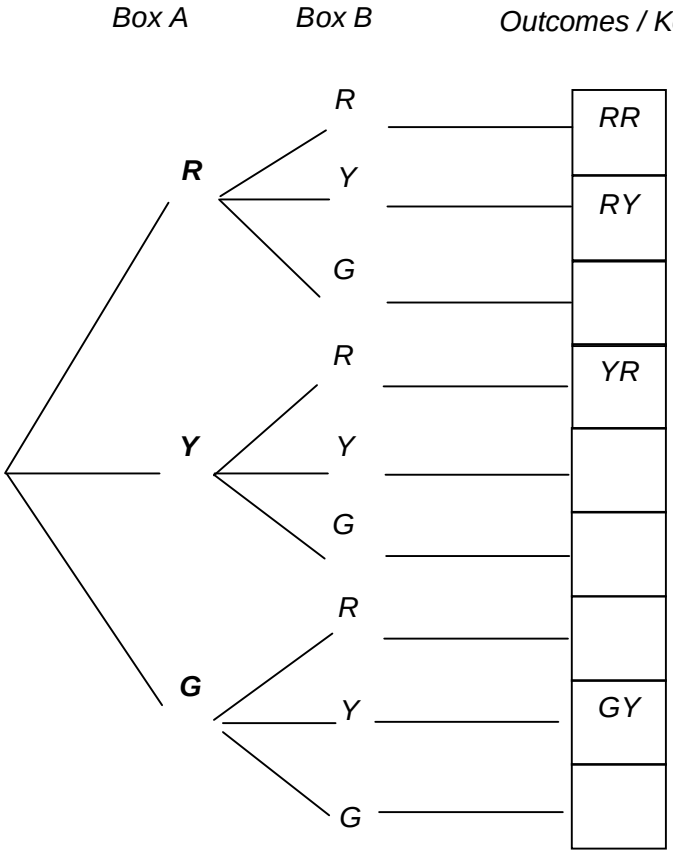

Diagram 4 /
Rajah 4

(b) Hence, find the probability that

Seterusnya, c*ari kebarangkalian bahawa*

(i) first ball is green

bola pertama berwarna hijau.

(ii) First ball is red or the second ball is yellow.

Bola pertama berwarna merah atau bola kedua berwarna kuning.

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5. Diagram 5 shows two sets of cards labeled with letters and number in box X and Y.

Rajah 5 menunjukkan dua set kad dilabel dengan huruf dan nombor di dalam kotak X dan Y.

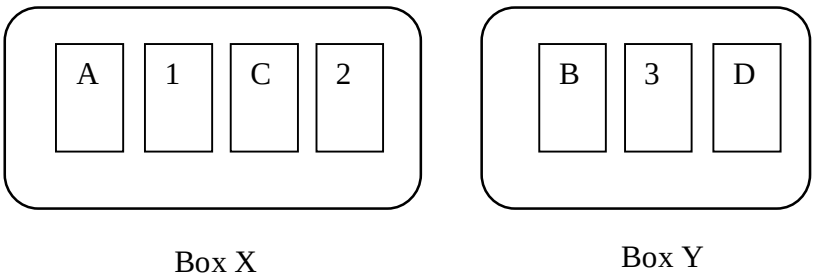

Diagram 4 / *Rajah 4*

A card is picked at random from each of the boxes.
Sekeping kad dipilih secara rawak daripada daripada setiap kotak.

(a) List the sample space.

Senaraikan ruang sampel.

(b) By listing all the outcomes of the event, find the probability that

Dengan menyenaraikan semua kesudahan peristiwa, cari kebarangkalian

(i) One of the cards picked is labeled with a number.

Salah satu kad yang dipilih dilabel dengan nombor.

(ii) Both cards labeled with letter or both cards labeled with number.

Kedua-dua kad dilabel dengan huruf atau kedua-dua kad dilabel dengan nombor.

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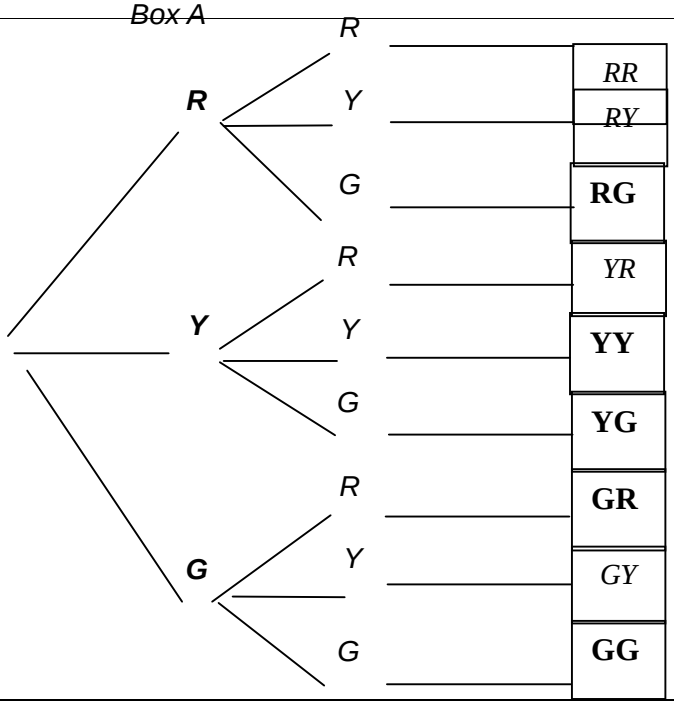
ANSWER / JAWAPAN

	Answer / *Jawapan*	**Mark / markah**
1.	(i) $\frac{3}{5}\times\frac{3}{5}$ $= \frac{9}{25}$ (ii) $\frac{3}{5}\times\frac{2}{5}+\frac{2}{5}\times\frac{3}{4}$ $= \frac{27}{50}$	1 1 2 1 **5**
2.	{(M,A), (M,T), (M,H), (M,S), (A,T), (A,H), (A,S), (T,H), (T,S), (H,S)} (a) {{(M,A), (M,T), (M,H), (M,S)} $= \frac{4}{10}$ (b) {(M,A), (M,T), (M,H), (M,S), (A,H), (T,H), (H,S)} $= \frac{7}{10}$	1 1 1 1 1 **5**
3.	{(H,2), (H,4), (H,6), (H,9), (T,2), (T,4), (T,6), (T,9)} (a) {(T,2), (T,4), (T,6)} $= \frac{3}{8}$ (b) {(H,2), (H,4), (H,6), (H,9), (T,9)} $= \frac{5}{8}$	1 1 1 1 1 **5**
4.	(a) 	1

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	(b)(i) {(G,R), (G,Y), (G,G)} $\frac{3}{9}$ (ii) {(R,R), (R,Y), (R,G), (Y,Y), (G,Y)} $\frac{5}{9}$	1 1 1 1 **5**
5.	(a) {(A,B), (A,3), (A,D), (1,B), (1,3), (1,D), (C,B), (C,3), (C,D), (2,B), (2,3), (2,D)} (b)(i) {(A,3), (1,B), (1,D), (C,3), (2,B), (2,D)} $\frac{6}{12}$ (ii) {(A,B), (A,D), (C,B), (C,D), (1,3), (2,3)} $\frac{6}{12}$	1 1 1 1 1 **5**

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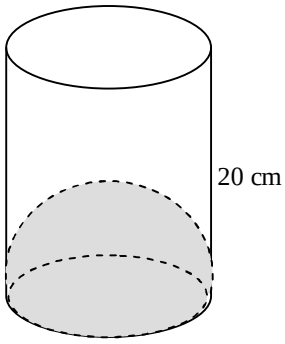
SOLID GEOMETRY
ISIPADU PEPEJAL

1 Diagram below shows a cylinder with radius 10 cm.A hemisphere is taken out of the solid.
Rajah menunjukkan sebuah silinder berjejari 10 cm.*Sebuah hemisfera dikeluarkan daripada pepejal itu.*

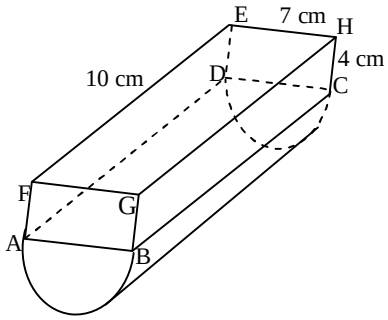


Calculate the volume, in cm^3, of the remaining solid.
Hitungkan isipadu, dalam cm^3,*pepejal yang tinggal.*

[Use/*Gunakan* $\pi = \frac{22}{7}$]

Answer/ *Jawapan*:

2 Diagram below shows a combined solid consists of a cuboid *ABCDEFGH* and a half cylinder which are joined at the plane *ABCD*.
Rajah menunjukkansebuah gabungan pepejal terdiri daripada sebuah kuboid ABCDEFGH dan separuh silinder yang tercantum pada satah ABCD.



Given *CH* = 4 cm, *FE* = 10 cm and *EH* = 7 cm.Calculate the volume, in cm 3 of the solid.
Diberi CH = 4 cm, *FE = 10* cm *dan EH = 7* cm.*Hitung isipadu dalam* cm^3 *pepejal itu.*

[Use/*Gunakan* $\pi = \frac{22}{7}$]

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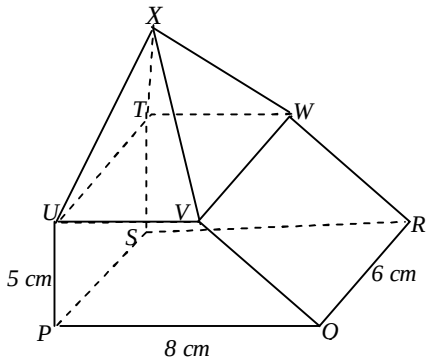
3 Diagram below shows a combined solid consists of right pyramid *UVWTX* and a prism *PQRSTUVW* which are joined at the plane *UVWT*. Trapezium *PQVU* is the uniform cross section of the prism.
Rajah di bawah menunjukkan sebuah gabungan pepejal yang terdiri daripada sebuah piramid tegak UVWTX dan sebuah prisma PQRSTUVW yang tercantum pada satah UVWT.Trapezium PQVU ialah keratan rentas seragam prisma itu.

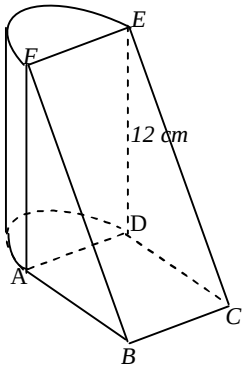


The height of vertex *X* from the base *PQRS* is 9 cm.
Tinggi puncak piramid X dari tapak PQRS ialah 9 cm.

Calculate the volume in cm^3 of the solid.
Hitungkan isipadu, dalam cm^3*, pepejal itu.*

Answer/ *Jawapan*:

4 Diagram below shows a combined solid consists of a right prism and a half circular cylinder which are joined at the rectangular plane *ADEF*. Triangle *ABF* is the uniform cross section of the prism. The diameter of the half cylinder is 10.5 cm and the volume of the composite solid is 1338.75 cm^3.
Rajah di bawah menunjukkan sebuah gabungan pepejal yang terdiri daripada sebuah prisma tegak dan sebuah separuh silinder yang tercantum pada satah ADEF.Segitiga ABF ialah keratan rentas seragam prisma itu.Diameter separuh silinder itu ialah 10.5 cm *dan isipadu gabungan pepejal itu ialah 1338.75* cm^3.



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Using $\pi = \frac{22}{7}$, calculate

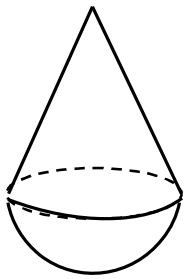
Dengan menggunakan $\pi = \frac{22}{7}$ *, hitung*

(a) the volume, in cm^3, of the half cylinder
isipadu, separuh silinder, dalam cm^3

(b) the length, in cm, of *AB*
hitung panjang, dalam cm, *AB.*

Answer/ *Jawapan*:

5 The diagram shows a composite formed by the combination of a hemisphere and a cone. The diameter of hemisphere and the cone is 8 cm, whereas the length of the slant edge of the cone is 5 cm.
Rajah menunjukkan sebuah gabungan pepejal yang dibentuk daripada cantuman sebuah hemisfera dan sebuah kon.Diameter hemisfera dan kon itu ialah 8 cm *dimana panjang sendeng kon ialah 5* cm.



Calculate
Hitung
(a) the height in cm, of the cone
tinggi dalam cm, *bagi kon*
(b) the volume in cm^3, of the solid
isipadu dalam cm^3 *bagi pepejal itu*

[Use/*Gunakan* $\pi = \frac{22}{7}$]

Answer/ *Jawapan*:

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Question	Solution and Mark Scheme	Marks	
1	$\frac{22}{7}\times 10\times 10\times 20$	1	
	$\frac{2}{3}\times\frac{22}{7}\times 10\times 10\times 10$	1	
	$\frac{22}{7}\times 10\times 10\times 20 \quad + \quad \frac{2}{3}\times\frac{22}{7}\times 10\times 10\times 10$	1	
	$4190\frac{10}{21}$ *or* 4190.47	1	**4**
2	$10\times 7\times 4$	1	
	$\frac{1}{2}\times\frac{22}{7}\times 3.5\times 3.5\times 10$	1	
	$10\times 7\times 4 \quad + \quad \frac{1}{2}\times\frac{22}{7}\times 3.5\times 3.5\times 10$	1	
	472.5 *or* $472\frac{1}{2}$	1	**4**
3	$\frac{1}{3}\times 6\times 6\times 4$	1	
	$\frac{1}{2}\times(6+8)\times 5\times 6$	1	
	$\frac{1}{3}\times 6\times 6\times 4 \quad + \quad \frac{1}{2}\times(6+8)\times 5\times 6$	1	
	258	1	**4**

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4

(a) $\frac{1}{2}\times\frac{22}{7}\times 5.25\times 5.25\times 12$ 1

$519\frac{3}{4}$ *or* 519.75 1

(b) $\frac{1}{2}\times AB\times 12\times 10.5$ 1

$\frac{1}{2}\times\frac{22}{7}\times 5.25\times 5.25\times 12 + \frac{1}{2}\times AB\times 12\times 10.5 = 1338.75$ 1

$AB = 13$ 1 **5**

5

a) $\sqrt{5^2-4^2}$ *or* 3 1

b) $\frac{1}{3}\times\frac{22}{7}\times 4\times 4\times 3$ *or* $\frac{2}{3}\times\frac{22}{7}\times 4\times 4\times 4$ 1

$\frac{1}{3}\times\frac{22}{7}\times 4\times 4\times 3 + \frac{2}{3}\times\frac{22}{7}\times 4\times 4\times 4$ 1

$184\frac{8}{21}$ *or* 184.38 1 **4**

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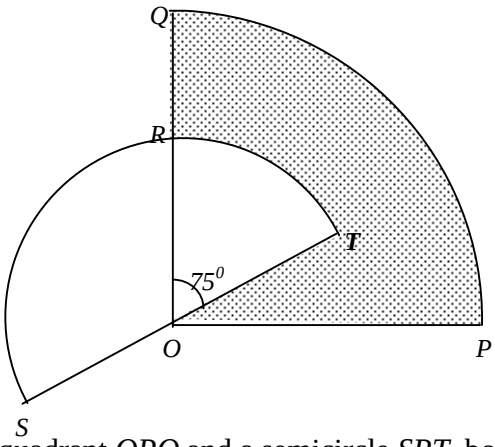
Circles 1 & II

1



The diagram shows a quadrant *OPQ* and a semicircle *SRT*, both with centre *O*. *OP* = 21 cm and *OT* = 14 cm. Calculate

Rajah menunjukkan sukuan OPQ dan semi bulatan SRT,kedua-dua berpusat di O. OP = 21 dan OT = 14 cm.Hitung

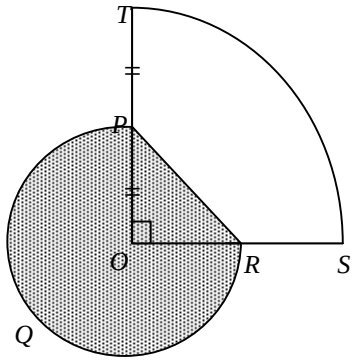
(a) the area, in cm^2 of the shaded region.
luas dalam cm^2 kawasan berlorek

(b) the perimeter, in cm of the whole diagram
perimeter dalam cm seluruh rajah

[*Use* $\pi = \frac{22}{7}$]

2 Diagram below shows *PQR* and *TS* are two arcs of the circles with a common centre *O*.

Rajah di bawah menunjukkan dua sektor bulatan PQR dan TS kedua-duanya berpusat O.



Given *OP* = *PT* = 3.5 cm, use *Use* $\pi = \frac{22}{7}$ to calculate

Diberi OP = PT = 3.5 cm, dengan menggunakan $\pi = \frac{22}{7}$ *hitungkan*

(a) the perimeter of the whole diagram, in cm.
perimeter, dalam cm, seluruh rajah itu.

(b) the area of the shaded region, in cm^2.
luas dalam cm^2,kawasan yang berlorek

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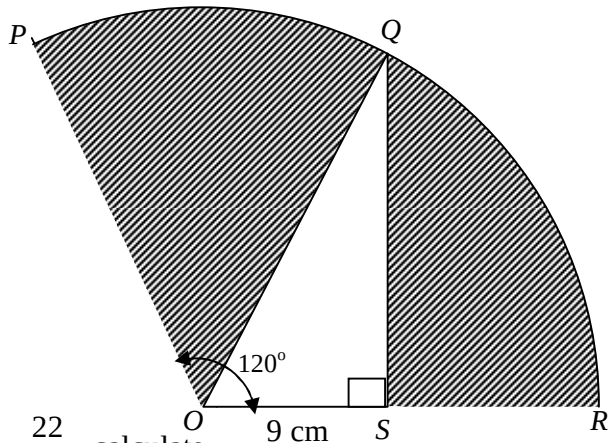
3 The diagrams shows a sector $OPQR$ of radius 15 cm.
Rajah menunjukkan satu sektor bulatan OPQR berjejari 15 cm.



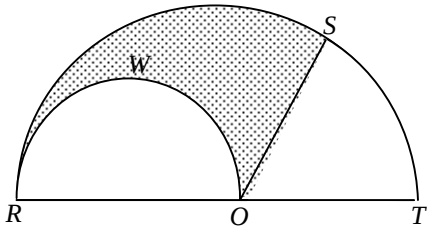
Using $\pi = \frac{22}{7}$, calculate

Hitung,

(a) the perimeter in cm, of the shaded region.
Perimeter dalam cm, kawasan berlorek

(b) the area, in cm^2, of the shaded region
luas dalam cm^2,kawasan berlorek

4 Diagram shows a semicircle *ORST* and a sector *OST* with common sector *O* and diameter 28 cm.*RWO* is a semicircle with diameter 14 cm. Given that angle $\angle SOT = 60^o$, *ROT* and *OS* are straight lines.
Rajah menunjukkan semibulatan ORST dan sektor OST dengan pusat sepunya O dan diameter 28 cm.RWO ialah semibulatan dengan diameter 14 cm. Diberi $\angle SOT = 60^o$, ROT dan OS ialah garis lurus.



Using $\pi = \frac{22}{7}$, calculate

Dengan menggunakan $\pi = \frac{22}{7}$, hitung

(a) the perimeter in cm, of the unshaded region
perimeter, dalam cm, kawasan yang tidak berlorek.

(b) the area of the shaded region, in cm^2.
luas dalam cm^2,kawasan yang berlorek

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5

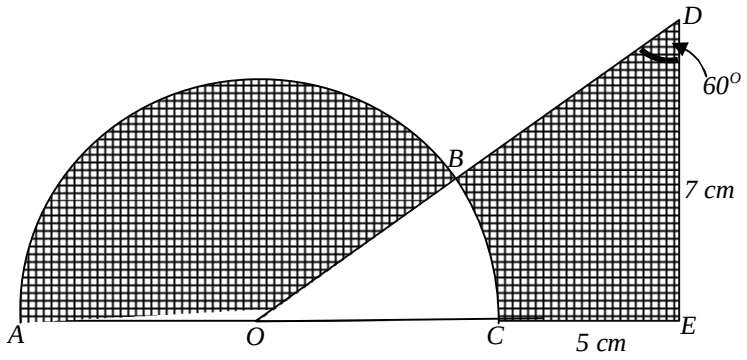

Diagram above shows a semicircle *OABC* with centre *O* and radius of 7 cm. *B* is the midpoint of *OD*. *OED* is a right angled triangle and $\angle ODE = 60^0$. *AOCE* is a straight line.By using $\pi = \frac{22}{7}$, find

Rajah di atas menunjukkan semi bulatan OABC berpusat O dan berjejari 7 cm.B ialah titik tengah AD.OED ialah segitiga bersudut tegak dan $\angle ODE = 60^0$. *AOCE ialah garis lurus. Dengan menggunakan* $\pi = \frac{22}{7}$, *hitung*

(a) the perimeter in cm of the whole diagram,
perimeter dalam cm, seluruh rajah

(b) the area, in cm^2 of the shaded region.
luas dalam cm^2,*kawasan berlorek*

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Question	Solution and Mark Scheme	Marks	
1	a) $\frac{90}{360}\times\frac{22}{7}\times 21\times 21$ *or* $\frac{75}{360}\times\frac{22}{7}\times 14\times 14$	1	
	$\frac{90}{360}\times\frac{22}{7}\times 21\times 21 - \frac{75}{360}\times\frac{22}{7}\times 14\times 14$	1	
	218.17	1	
	b) $\frac{90}{360}\times 2\times\frac{22}{7}\times 21$ *or* $\frac{105}{360}\times 2\times\frac{22}{7}\times 14$	1	
	$\frac{90}{360}\times 2\times\frac{22}{7}\times 21 + \frac{105}{360}\times 2\times\frac{22}{7}\times 14 +$	1	
	21+7+14		
	100.67	1	**6**
2	a) $\frac{270}{360}\times 2\times\frac{22}{7}\times 3.5$ *or* $\frac{90}{360}\times 2\times\frac{22}{7}\times 7$	1	
	$\frac{270}{360}\times 2\times\frac{22}{7}\times 3.5 + \frac{90}{360}\times 2\times\frac{22}{7}\times 7 + 3.5+3.5$	1	
	34.5	1	
	b) $\frac{270}{360}\times\frac{22}{7}\times 3.5\times 3.5$ *or* $\frac{1}{2}\times 3.5\times 3.5$	1	
	$\frac{270}{360}\times\frac{22}{7}\times 3.5\times 3.5 + \frac{1}{2}\times 3.5\times 3.5$	1	
	35	1	**6**

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Question	Solution and Mark Scheme	Marks
3	a) $\frac{120}{360}\times 2\times\frac{22}{7}\times 15$	1
	$\frac{120}{360}\times 2\times\frac{22}{7}\times 15 \;+\; 6 + 12 + 15 + 15$	1
	79.42	1
	b) $\frac{120}{360}\times\frac{22}{7}\times 15\times 15$ *or* $\frac{1}{2}\times 9\times 7\times 12$	1
	$\frac{120}{360}\times\frac{22}{7}\times 15\times 15 \;-\; \frac{1}{2}\times 9\times 12$	1
	181.71	1 **6**
4	a) $\frac{180}{360}\times 2\times\frac{22}{7}\times 7$ *or* $\frac{60}{360}\times 2\times\frac{22}{7}\times 14$	1
	$\frac{180}{360}\times 2\times\frac{22}{7}\times 7 \;-\; \frac{60}{360}\times 2\times\frac{22}{7}\times 14 \;+ 14 + 14 + 14$	1
	78.67	1
	b) $\frac{120}{360}\times\frac{22}{7}\times 14\times 14$ *or* $\frac{180}{360}\times\frac{22}{7}\times 7\times 7$	1
	$\frac{120}{360}\times\frac{22}{7}\times 14\times 14 \;-\; \frac{180}{360}\times\frac{22}{7}\times 7\times 7$	1
	128.33	1 **6**

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Question	Solution and Mark Scheme	Marks	
5	a) $\frac{150}{360}\times 2\times\frac{22}{7}\times 7$	1	
	$\frac{150}{360}\times 2\times\frac{22}{7}\times 7 \ + \ 7+7+7+7+5$	1	
	51.33	1	
	b) $\frac{150}{360}\times\frac{22}{7}\times 7\times 7$ *or* $\frac{1}{2}\times 12\times 7$ *or* $\frac{30}{360}\times\frac{22}{7}\times 7\times 7$	1	
	$\frac{150}{360}\times\frac{22}{7}\times 7\times 7 \ + \ \frac{1}{2}\times 12\times 7 \ - \ \frac{30}{360}\times\frac{22}{7}\times 7\times 7$	1	
	93.34	1	**6**

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MATRICES
MATRIKS

1. (a) Find the inverse of matrix $\begin{pmatrix} 3 & 1 \\ 5 & 3 \end{pmatrix}$

Carikan matriks songsang bagi $\begin{pmatrix} 3 & 1 \\ 5 & 3 \end{pmatrix}$.

(b) Write the following simultaneous equations as matrix equation :
Tuliskan persamaan linear serentak berikut dalam bentuk persamaan matriks:

$$3k + w = 16$$
$$5k + 3w = 20$$

Hence, using matrices, calcúlate the value of *k* and of *w.*
Seterusnya dengan menggunakan kaedah matriks, hitungkan nilai k dan nilai w.

2. P is a 2 x 2 matrix in which $\begin{pmatrix} 4 & 2 \\ 3 & 2 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

P ialah satu matriks 2 x 2 dengan keadaan $P\begin{pmatrix} 4 & 2 \\ 3 & 2 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

(a) Find matrix P.
Carikan matriks P

(b) Write the following simultaneous equations as matrix equation :
Tuliskan persamaan linear serentak berikut dalam bentuk persamaan matriks:

$$x + y = -2$$
$$3x + 6y = 3$$

Hence, using matrices, calcúlate the value of *x* and of *y*
Seterusnya,dengan mengunakan kaedah matriks, hitungkan nilai x dan nilai y.

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3. a) *A* is a 2 x 2 matrix in which $A\begin{pmatrix} \frac{3}{2} & -8 \\ 2 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

A ialah satu matriks 2 x 2 dengan keadaan $A\begin{pmatrix} \frac{3}{2} & -8 \\ 2 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

Find matrix *A*.
Tentukan matriks A.

b) Hence, by using matrix method, calculate the value of *x* and of *y* which satisfy the following simultaneous linear equations:
Seterusnya dengan menggunakan kaedah matriks, hitungkan nilai m dan n yang memuaskan persamaan linear serentak yang berikut:

$$\frac{3}{2}m - 8n = 2$$
$$2m + n = -9$$

4. a) Given matrix $M = \begin{pmatrix} 3 & k \\ -1 & 2 \end{pmatrix}$

Diberi bahawa matriks $M = \begin{pmatrix} 3 & k \\ -1 & 2 \end{pmatrix}$

(i) Find the value of *k* if the inverse matrix of *M* does not exist.
cari nilai k jika songsangan matriks M tidak wujud.

(ii) Given the value of $k = 4$
Diberi nilai k = 4

(a) Find the inverse matrix of *M*
cari matriks songsang bagi M

(b) Hence, by using matrix method, calculate the value of *x* and of *y* which satisfy the following simultaneous linear equations:
Seterusnya dengan menggunakan kaedah matriks, hitungkan nilai m dan n yang memuaskan persamaan linear serentak yang berikut:

$$\begin{pmatrix} 3 & k \\ -1 & 2 \end{pmatrix}\begin{pmatrix} p \\ q \end{pmatrix} = \begin{pmatrix} 11 \\ 3 \end{pmatrix}$$

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5. (a) The inverse matrix of $\begin{pmatrix} 3 & 2 \\ 1 & -4 \end{pmatrix}$ is $\frac{1}{m}\begin{pmatrix} n & -2 \\ -1 & 3 \end{pmatrix}$

Matriks songsang bagi $\begin{pmatrix} 3 & 2 \\ 1 & -4 \end{pmatrix}$ *ialah* $\frac{1}{m}\begin{pmatrix} n & -2 \\ -1 & 3 \end{pmatrix}$.

Find the value of *m* and of *n*.
Cari nilai m dan n.

(b) By using matrix method, calculate the value of *x* and of *y* which satisfy the following simultaneous linear equations:
Dengan menggunakan kaedah matriks, hitungkan nilai x dan nilai y yang memuaskan persamaan linear serentak berikut:

$$3x + 2y = 6$$
$$x - 4y = 16$$

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ANSWER / *JAWAPAN*

	Answer / Jawapan	Marks / Markah
1.	(a) $\frac{1}{4}\begin{pmatrix} 3 & -1 \\ -5 & 3 \end{pmatrix}$	2
	(b) $\begin{pmatrix} 3 & 1 \\ 5 & 3 \end{pmatrix}\begin{pmatrix} k \\ w \end{pmatrix} = \begin{pmatrix} 16 \\ 20 \end{pmatrix}$	1
	$\frac{1}{3(3)-1(5)}\begin{pmatrix} 3 & -1 \\ -5 & 3 \end{pmatrix}\begin{pmatrix} 19 \\ 20 \end{pmatrix}$	1
	$k = 7$	1
	$w = -5$	1 **6**
2.	(a) $\frac{1}{2}\begin{pmatrix} 2 & -2 \\ -3 & 4 \end{pmatrix}$	2
	(b) $\begin{pmatrix} 1 & 1 \\ 3 & 6 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$	1
	$\frac{1}{1(6)-1(3)}\begin{pmatrix} 6 & -1 \\ -3 & 1 \end{pmatrix}\begin{pmatrix} -2 \\ 3 \end{pmatrix}$	1
	$x = -5$	1
	$y = 3$	1 **6**
3.	(a) $-\frac{2}{35}\begin{pmatrix} 1 & 8 \\ -2 & \frac{3}{2} \end{pmatrix}$	2
	(b)	

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	$\begin{pmatrix} \frac{3}{2} & -8 \\ 2 & 1 \end{pmatrix}\begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} 2 \\ -9 \end{pmatrix}$ $\frac{1}{\frac{3}{2}(1)-(-8)(2)}\begin{pmatrix} 1 & 8 \\ -2 & \frac{3}{2} \end{pmatrix}\begin{pmatrix} 2 \\ -9 \end{pmatrix}$ $m = -4$ $n = -1$	2 1 1 **6**
4.	(a))(i) $3(2) - k(-1) = 0$ $k = -6$ (ii) $\frac{1}{3(2)-4(-1)}\begin{pmatrix} 2 & -4 \\ 1 & 3 \end{pmatrix}$ $\frac{1}{10}\begin{pmatrix} 2 & -4 \\ 1 & 3 \end{pmatrix}$ (b) $\frac{1}{3(2)-4(-1)}\begin{pmatrix} 2 & -4 \\ 1 & 3 \end{pmatrix}\begin{pmatrix} 11 \\ 3 \end{pmatrix}$ $p = 1$ $q = 2$	1 2 1 1 1 **6**
5.	(a) $m = -14$ $n - 4$ (b) $\frac{1}{3(-4)-2(1)}\begin{pmatrix} -4 & -2 \\ -1 & 3 \end{pmatrix}\begin{pmatrix} 6 \\ 16 \end{pmatrix}$ $x = 4$ $y = -3$	1 1 2 1 1 **6**

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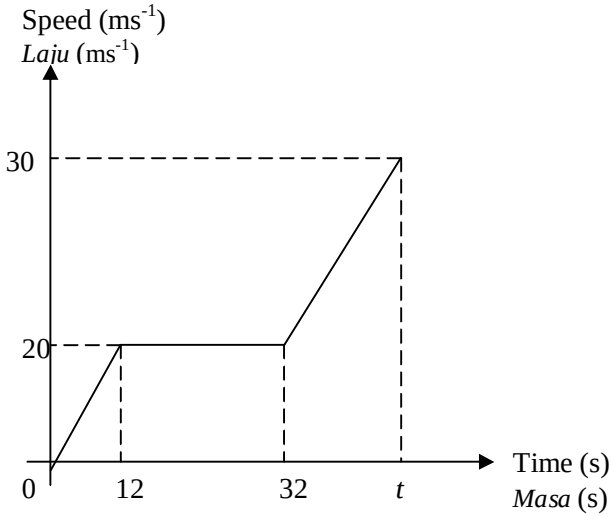
GRADIENT AND AREA UNDER A GRAPH
KECERUNAN DAN LUAS DI BAWAH GRAF

1 Diagram shows the speed-time graph of a particle for a period of *t* seconds.
Rajah menunjukkan graf laju-masa bagi pergerakan suatu zarah dalam tempoh t saat.

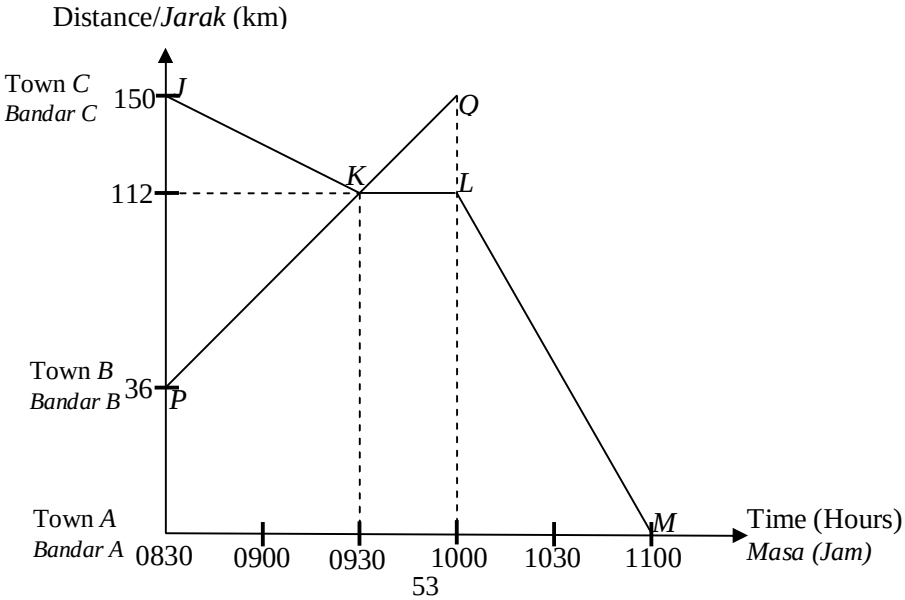


a) State the length of time, in s, that the particle moves with uniform speed.
Nyatakan laju seragam, dalam ms^{-1}, *zarah itu*.

b) Calculate the rate of change of speed, in ms^{-2}, in the first 12 seconds.
Hitungkan kadar perubagan laju,dalam ms^{-2}, *dalam tempoh 12 saat.*

c) Calculate the value of *t*, if the total distance traveled for the period of *t* seconds is 620 meters.
Hitungkan nilai t, jika jumlah jarak yang dilalui dalam tempoh t saat itu ialah 620 meter.

2 Diagram shows the distance-time graph of the journey of a bus and a lorry .
Rajah menunjukkan graf jarak-masa bagi perjalanan sebuah bas dan sebuah lori.



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The graph *PQ* represents the journey of the van from Town *B* to Town *C*.The graph *JKLM* represents the journey of the car from Town *C* to Town *A*.The van left Town *B* and the car left Town *C* at along the same road.

Graf PQ mewakili perjalanan van dari BandarB ke Bandar C.Graf JKLM pula mewakili perjalanan kereta dari bandar C ke bandar A.. Van bertolak dari Bandar B dan kereta bergerak dari Bandar C pada jalan yang sama.

(a) (i) State the length of time in minutes, during which the van is stationery.
Nyatakan tempoh masa ,dalam minit, van itu berhenti.

(ii) State the time when both vehicles meets.
Nyatakan waktu kedua-dua kenderaan itu bertemu.

(b) Find the distance in km, from Town *C* when the vehicles meets.
Cari jarak dalam km, dari Bandar C bila kedua-dua kenderaan itu bertemu.

(c) Calculate the average speed, in km h^{-1}, of the car for the whole journey.
Hitung purata laju dalam km h^{-1}, *kereta itu bagi keseluruhan perjalanan.*

3

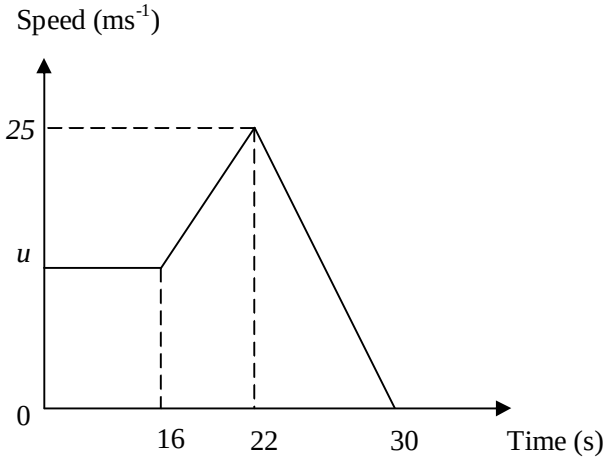

Diagram shows the speed-time graph for the movement of a particle for a period of 30 seconds.
Rajah menunjukkan graf laju-masa bagi pergerakan satu zarah dalam tempoh 30 saat.

a) State the length of time, in *s*, for which the particle moves with uniform speed.
Nyatakan laju seragam, dalam s, zarah itu.

b) Calculate the rate of change of speed, in ms^{-2}, in the last 8 seconds.
Hitungkan perubahan laju, dalam ms^{-2}, *dalam 8 saat terakhir.*

c) Calculate the value of u, if the distance traveled in the last 14 seconds is 229 m.
Hitungkan nilai u, jika jarak perjalanan dalam 14 saat terakhir ialah 229.

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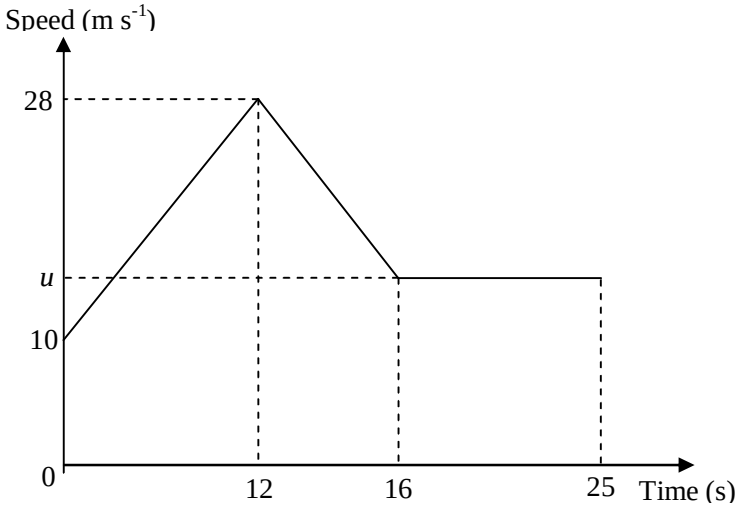
4 Diagram shows a speed-time graph for the movement of a particle for a period of 25s.
Rajah menunjukkan graf laju-masa bagi pergerakan satu zarah dalam tempoh 25 saat.



(*a*) State the duration of time s, for which the particle moves with uniform speed.
Nyatakan tempoh masa, dalam s,zarah itu bergerak dengan laju seragam.

(*b*) Calculate the rate of change of speed, in ms^{-2}, in the first 12 s.
Hitungkan perubahan laju dalam ms^{-2} *dalam 12 saat pertama.*

(*c*) Calculate the value of *u*, if the total distance traveled in the period of 25 s is 438 m.
Hitungkan nilai u,jika jumlah jarak dalam tempoh 25s ialah 438m.

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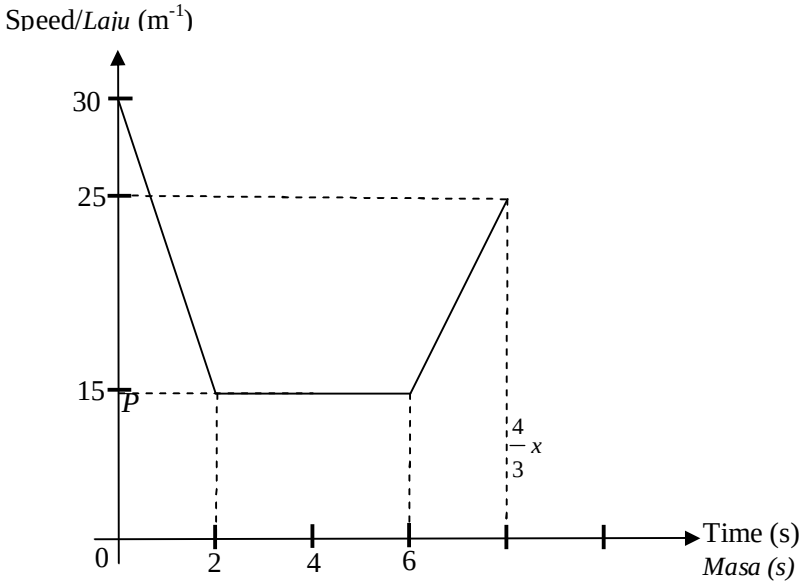
5 Diagram shows a speed-time graph for the movement of a particle for a period of $\frac{4}{3}x$ s.

Rajah menunjukkan graf laju-masa bagi pergerakan satu zarah dalam tempoh $\frac{4}{3}x$ *saat.*



a) State the length of time, is s, during the particle moves at uniform speed.
Nyatakan tempoh masa, dalam, s, zarah itu bergerak dengan laju seragam.

b) Calculate the rate of change of speed, in ms^{-2}, of the particle in the first 2 seconds.
Hitungkan kadar perubahan laju, dalam ms^{-2}*, zarah itu dalam 2 saat pertama.*

c) The total distance travelled in $\frac{4}{3}x$ seconds is 145 meters.Calculate the value of x.

Jumlah jarak yang telah dilalui dalam $\frac{4}{3}x$ *saat ialah 145 meter.Hitung nilai x.*

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Question	Solution and Mark Scheme –	Marks	
1 (*a*)	$32 - 12$		
	20	1	
(*b*)	$\frac{20-0}{12-0}$	1	
	1.67	1	
(*c*)	$\frac{1}{2}(20+32)\times 20 + \frac{1}{2}(20+30)\times(t-32) = 620$	1	
	$25t = 900$	1	
	36	1	**6**
2(*a*)(i)	30	1	
(ii)	9.30	1	
(*b*)	$150 - 112$	1	
	38	1	
(*c*)	$\frac{150}{2.5}$	1	
	60	1	**6**

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Question	Solution and Mark Scheme	Marks	
3(*a*)	16	1	
(*b*)	$\frac{0-20}{8}$	1	
	-2.5	1	
(*c*)	$\frac{1}{2}(u+25)+\frac{1}{2}\times 25\times 8 = 229$	1	
	$3u = 54$	1	
	18	1	**6**
4(*a*)	9	1	
(*b*)	$\frac{28-10}{12-0}$	1	
	1.5	1	
(*c*)	$\frac{1}{2}(10+28)\times 12+\frac{1}{2}(28+u)\times 4+(u\times 9)=438$	1	
	$11u = 154$	1	
	14	1	**6**

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Question	Solution and Mark Scheme	Marks
5 (*a*)	4	1
(*b*)	$\frac{30-15}{2}$	1
	7.5	1
(*c*)	$\frac{1}{2}(30+15)\times 2+(15\times 4)+\frac{1}{2}(25+15)(\frac{4}{3}x-6)=145$	1
	$80x = 480$	1
	6	1 **6**

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LINES AND PLANE IN THREE DIMENSION / *GARIS DAN SATAH DALAM TIGA MATRA*

Paper 2

1. Diagram 1 shows a cuboid. M and N are the mid points of QR and UV respectively.
Rajah 1 menunjukkan sebuah kuboid. M and N ialah titik tengah QR and UV.

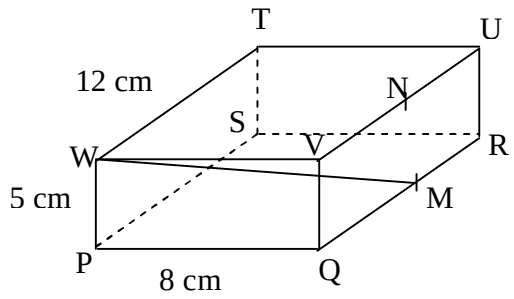
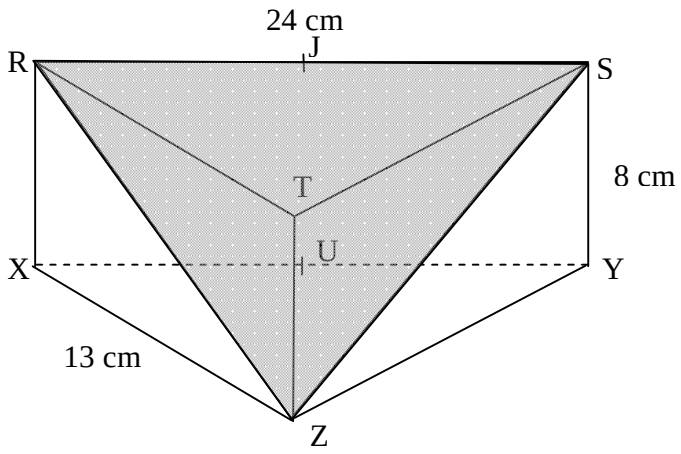


Diagram 1 /
Rajah 1

(a) Name the angle between line WM and plane WVUT.
Namakan sudut di antara garis WM dan satah WVUT.

(b) Calculate the angle between line WM and plane WVUT.
Hitungkan sudut antara garis WM dengan satah WVUT.

2. Diagram 2 shows a prism. J and U are the mid points of RS and XY respectively.
Rajah 2 menunjukkan sebuah kuboid. J and U ialah titik tengah RS and XY.



(a) Name the angle between plane RSZ and plane RSYX.
Namakan sudut di antara satah RSZ dan satah RSYX.

(b) Calculate the angle between plane RSZ and plane RSYX.
Hitungkan sudut antara satah RSZ dengan satah RSYX.

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3. Diagram 3 shows a cuboid. The base WXYZ is a horizontal rectangle. A, B, C and D are the midpoints of WX, JK, ML and ZY respectively.
Rajah 3 menunjukkan kuboid. Tapak ialah sebuah segiempat tepat yang mengufuk. A, B, C dan D adalah titik tengah WX, JK, ML dan ZY.

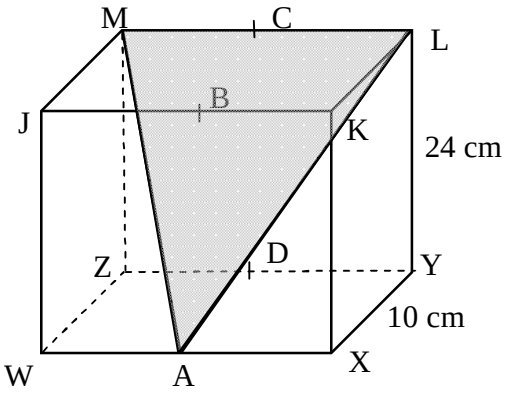

Diagram 3 /
Rajah3

(c) Name the angle between plane MAL and plane MLYZ.
Namakan sudut di antara satah MAL dan satah MLYZ.

(d) Calculate the angle between plane MAL and plane MLYZ.
Hitungkan sudut antara satah MAL dengan satah MLYZ.

4. Diagram 4 shows a cuboid. The base PQRS is a horizontal rectangle.
Rajah 4 menunjukkan kuboid. Tapak PQRS mengufuk ialah sebuah segiempat tepat yang mengufuk.

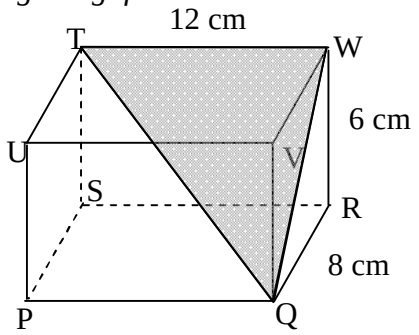

Diagram 4 /
Rajah4

(b) Name the angle between plane TQW and plane TSRW.
Namakan sudut di antara satah TQW dan satah TSRW.

(c) Calculate the angle between plane TQW and plane TSRW.
Hitungkan sudut antara satah TQW dengan satah TSRW.

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5. Diagram 5 shows a right prism. The base ABCD is a horizontal rectangle. Right-angled triangle FAB is the uniform cross-section of the prism. The rectangle surface BCEF is an inclined plane and EA = 13 cm.
Rajah 5 menunjukkan sebuah prisma tegak. Tapak segiempat tepat ABCD adalah mengufuk. Segitiga FAB adalah keratan rentas seragam prisma itu. Segiempat tepat BCEF ialah satah condong dan EA = 13 cm.

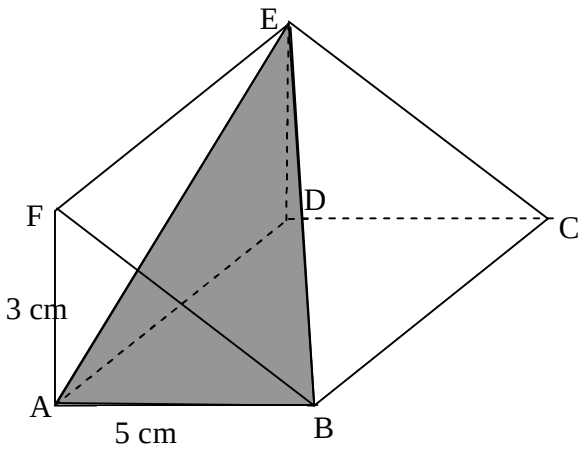

Diagram 5 /
Rajah 5

(a) Name the angle between line ABE and plane ABCD.
Namakan sudut di antara satah ABE dan satah ABCD.

(b) Calculate the angle between plane ABE and plane ABCD.
Hitungkan sudut antara satah ABE dengan satah ABCD.

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ANSWER / *JAWAPAN*

	Answer / Jawapan	**Mark / Markah**
1.	(a) ∠MWN (b) $\tan\theta = \frac{5}{10}$ 26.57º or 26º34'	1 1 1 **3**
2.	(a) ∠ZJU (b) $\tan\theta = \frac{5}{8}$ 32º	1 1 1 **3**
3.	(a) ∠ACD (b) $\tan\theta = \frac{10}{24}$ 22.62º or 22º 37'	1 1 1 **3**
4.	(a) ∠QWR (b) $\tan\theta = \frac{8}{6}$ 53.13º or 53º 8'	1 1 1 **3**
5.	(a) ∠EAD (b) $\sin\theta = \frac{3}{13}$ 13.34º or 13º 20'	1 1 1 **3**

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GRAPH FUNCTIONS
GRAF FUNGSI

1 (a) Complete the table below for the equation $y = \frac{x^2}{8} + 4$.

Lengkapkan jadual di bawah bagi persamaan $y = \frac{x^2}{8} + 4$

x	0	2	4	6	8	10	12
y	4	*h*	6	8.5	*k*	16.5	22

(b) For this part of the question, use the graph paper provided.You may use a flexible curve ruler.
Untuk ceraian soalan ini, gunakan kertas graf yang disediakan. Anda boleh menggunakan pembaris fleksibel.

By using a scale of 2 cm to 2 unit on both the axis, draw the graph of
$y = \frac{x^2}{8} + 4$ for $0 \le x \le 12$
Dengan menggunakan skala 2 cm kepada 2 unit pada kedua-dua paksi, lukiskan graf $y = \frac{x^2}{8} + 4$ *bagi* $0 \le x \le 12$.

(c) From your graph, find
Daripada graf anda, carikan

(i) the value of y, when $x = 9$
nilai y apabila x = 9

(ii) the value of x, when, $y = 15$
nilai x, apabila y = 15

(d) Draw a suitable straight line on your graph to find all the values of x which satisfy the equation $16(x - 2) = x^2$ for $0 \le x \le 12$.
State these values of x.
Lukiskan satu garis lurus yang sesuai pada graf anda untuk mencari semua nilai x yang memuaskan persamaan $16(x - 2) = x^2$ *bagi* $0 \le x \le 12$. *Nyatakan nilai-nilai x itu.*

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2 (a) Complete the table below for the equation $y = \frac{12}{x}$ by writing down the values y when $x = -3$ and $x = 1.5$

Lengkapkan jadual di bawah bagi persamaan $y = \frac{12}{x}$ *dengan menulis nilai-nilai y apabila* $x = -3$ *dan* $x = 1.5$

x	-4	-3	-2	-1	1	1.5	2	3	4
y	-3		-6	-12	12		6	4	3

(b) For this part of the question, use the graph paper provided.You may use a flexible curve ruler.
Untuk ceraian soalan ini, gunakan kertas graf yang disediakan. Anda boleh menggunakan pembaris fleksibel.

By using a scale of 2 cm to 1 unit on the x-axis and 2 cm to 2 unit on the y-axis, draw the graph of $y = \frac{12}{x}$ for $-4 \le x \le 4$

Dengan menggunakan skala 2 cm kepada 1 unit pada paksi -x dan 2cm kepada 2 unit pada paksi-y, lukiskan graf $y = \frac{12}{x}$ *bagi.* $-4 \le x \le 4$

(c) From your graph, find
Daripada graf anda, carikan

(i) the value of y, when $x = 1.4$
nilai y apabila x = 1.4

(ii) the value of x, when, $y = -5$
nilai x, apabila y = -5

(d) Draw a suitable straight line on your graph to find a value of x which satisfy the equation $2x^2 + 7x = 12$ for $-4 \le x \le 4$.
State this value of x.
Lukiskan satu garis lurus yang sesuai pada graf anda untuk mencari satu nilai x yang memuaskan persamaan $2x^2 + 7x = 12$ *bagi* $-4 \le x \le 4$ *. Nyatakan nilai x itu.*

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3 (a) Complete the table below for the equation $y = 10 - x^3$ by writing down the values of y when $x = -1$ and $x = 2$

Lengkapkan jadual di bawah bagi persamaan $y = 10 - x^3$ *dengan menulis nilai-nilai y apabila* $x = -1$ *dan* $x = 2$

x	-3	-2.5	-2	-1	0	1	2	2.5
y	37	25.6	18		10	9		-5.6

(b) For this part of the question, use the graph paper provided.You may use a flexible curve ruler.

Untuk ceraian soalan ini, gunakan kertas graf yang disediakan. Anda boleh menggunakan pembaris fleksibel.

By using a scale of 2 cm to 1 unit on the x-axis and 2 cm to 5 units on the y-axis, draw the graph of $y = 10 - x^3$ for $-3 \le x \le 2.5$

Dengan menggunakan skala 2 cm kepada 1 unit pada paksi -x dan 2cm kepada 5 unit pada paksi-y lukiskan graf $y = 10 - x^3$ *bagi.* $-3 \le x \le 2.5$

(c) From your graph, find

Daripada graf anda, carikan

(i) the value of y, when $x = 2.9$

nilai y apabila x =2.9

(ii) the value of x, when, $y = -13$

nilai x, apabila y = -13

(d) Draw a suitable straight line on your graph to find the values of x which satisfy the equation $x^3 - 10x - 5 = 0$ for $-3 \le x \le 2.5$.

State these values of x.

Lukiskan satu garis lurus yang sesuai pada graf anda untuk mencari semua nilai x yang memuaskan persamaan $x^3 - 10x - 5 = 0$ *bagi* $-3 \le x \le 2.5$ *. Nyatakan nilai-nilai x itu.*

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4 (a) Complete the table below for the equation $y = -\frac{3}{x}$.

Lengkapkan jadual di bawah bagi persamaan $y = -\frac{3}{x}$.

x	-3	-1.5	-1	-0.5	0.5	1	2	3
y	1		3	6	-6	-3		-1

(b) For this part of the question, use the graph paper provided.You may use a flexible curve ruler.

Untuk ceraian soalan ini, gunakan kertas graf yang disediakan. Anda boleh menggunakan pembaris fleksibel.

By using a scale of 2 cm to 1 unit on the *x*-axis and 2 cm to 2 units on the *y*-axis, draw the graph of $y = -\frac{3}{x}$ for $-3 \le x \le 3$

Dengan menggunakan skala 2 cm kepada 2 unit pada paksi -x dan 2cm kepada 2 unit pada paksi-y, lukiskan graf $y = -\frac{3}{x}$ *bagi.* $-3 \le x \le 3$

(c) From your graph, find

Daripada graf anda, carikan

(i) the value of *y*, when *x* = 1.2

nilai y apabila x = 1.2

(ii) the value of *x*, when, *y* = 4.2

nilai x, apabila y = 4.2

(d) Draw a suitable straight line on your graph to find the values of *x* which satisfy the equation $\frac{3}{x} = 2x + 2$ for $-3 \le x \le 3$.

State these values of *x*.

Lukiskan satu garis lurus yang sesuai pada graf anda untuk mencari satu nilai x yang memuaskan persamaan $\frac{3}{x} = 2x + 2$ *bagi* $-3 \le x \le 3$ *. Nyatakan nila-nilaii x itu.*

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5 (a) Complete the table below for the equation $y = x^2 - 2x + 5$.

Lengkapkan jadual di bawah bagi persamaan $y = x^2 - 2x + 5$

x	-3	-2.5	-2	-1	0	1	2	3	4
y	20	16.25		8	5		5	8	13

(b) For this part of the question, use the graph paper provided.You may use a flexible curve ruler.

Untuk ceraian soalan ini, gunakan kertas graf yang disediakan. Anda boleh menggunakan pembaris fleksibel.

By using a scale of 2 cm to 1 unit on the *x*-axis and 2 cm to 2 units on the *y*-axis, draw the graph of $y = x^2 - 2x + 5$ for $-3 \le x \le 4$

Dengan menggunakan skala 2 cm kepada 1 unit pada paksi-x dan 2cm kepada 2 unit pada paksi-y, lukiskan graf $y = x^2 - 2x + 5$ *bagi* $-3 \le x \le 4$.

(c) From your graph, find

Daripada graf anda, carikan

(i) the value of *y*, when *x* = 1.5

nilai y apabila x = 1.5

(ii) the value of *x*, when, *y* = 9

nilai x, apabila y = 9

(d) Draw a suitable straight line on your graph to find all the values of *x* which satisfy the equation $x^2 - x = 9$ for $-3 \le x \le 4$.

State these values of *x*.

Lukiskan satu garis lurus yang sesuai pada graf anda untuk mencari semua nilai x yang memuaskan persamaan $x^2 - x = 9$ *bagi* $-3 \le x \le 4$ *. Nyatakan nilai-nilai x itu.*

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Question	Solution and Mark Scheme	Marks	
1(*a*)	$h = 4.5$	K1	
	$k = 12$	K1	**2**
(*b*)	Graph		
	Axes drawn in correct directions uniform scale for $0 \le x \le 12$ and $4 \le y \le 22$	P2	
	All 7 points and *2 points correctly plotted or the curve passes through these points for $0 \le x \le 12$ and . $4 \le y \le 22$	K2	
	A smooth and continuous curve without any straight line and passes through all 9 correct points using the given scale for $0 \le x \le 12$ and $4 \le y \le 22$. Note: 1. 7 or 8 points correctly plotted, award K1 2. Ignore curve out of range.	N1	**5**
(*c*)(i)	$14 \le y \le 14.5$	P1	**2**
(ii)	$9.5 \le x \le 9$	P1	
	Note: 1. Allow P marks if values of x and of y are shown on the graph. 2. Values of x and y obtained by calculation, award P0 or from wrong graph, award P0		
(*d*)	Identify equation $y = 2x$	K1	
	Straight line $y = 2x$ correctly drawn	K1	
	Values of x : $2.3 \le x \le 2.2$	N1	**3**
	Note: 1. Allow N marks if values of x are shown on the graph. 2. Values of x obtained by calculation, award N0		**12**

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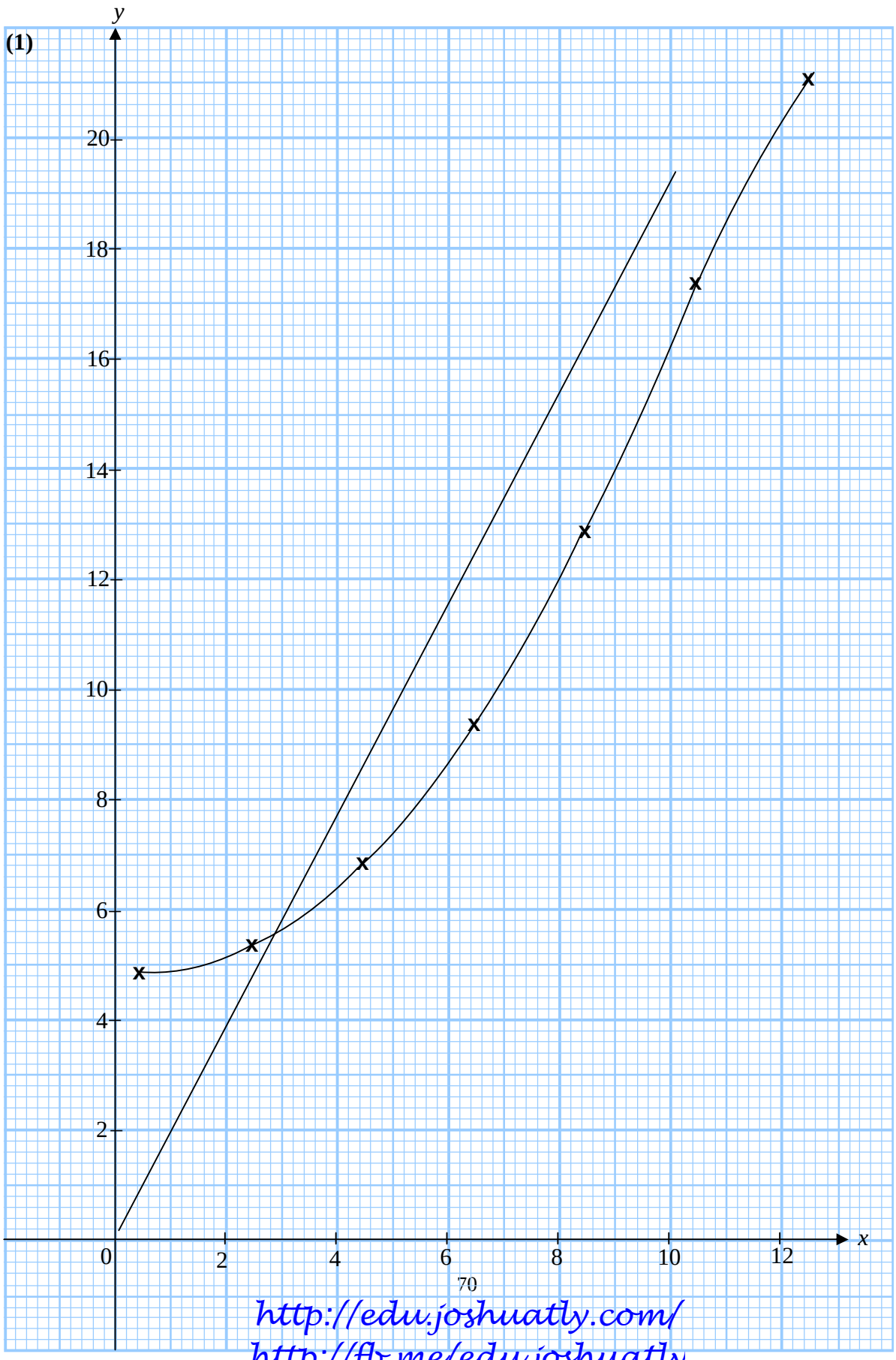
(1)



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Question	Solution and Mark Scheme	Marks	
2 (*a*)	- 4	K1	
(*b*)	8	K1	**2**
	Graph		
	Axes drawn in correct directions uniform scale for $-4 \le x \le 4$ and $-12 \le y \le 12$	P2	
	All 7 points and *2 points correctly plotted or the curve passes through these points for $-4 \le x \le 4$ and $-12 \le y \le 12$.	K2	
	A smooth and continuous curve without any straight line and passes through all 9 correct points using the given scale for $-4 \le x \le 4$ and $-12 \le y \le 12$.	N1	**5**
	Note: 1. 7 or 8 points correctly plotted, award K1 2. Ignore curve out of range.		
(*c*) (i)	$8.5 \le y \le 8.7$	P1	
(ii)	$-2.3 \le x \le -2.5$	P1	**2**
	Note: 1. Allow P marks if values of x and of y are shown on the graph. 2. Values of x and y obtained by calculation, award P0 or from wrong graph, award P0		
(*d*)	Identify equation $y = 2x + 7$	K1	
	Straight line $y = 2x + 7$ correctly drawn	K1	
	Value of x :		
	$1.3 \le x \le 1.2$	N1	**3**
	Note: 1. Allow N marks if values of x are shown on the graph. 2. Values of x obtained by calculation, award N0		**12**

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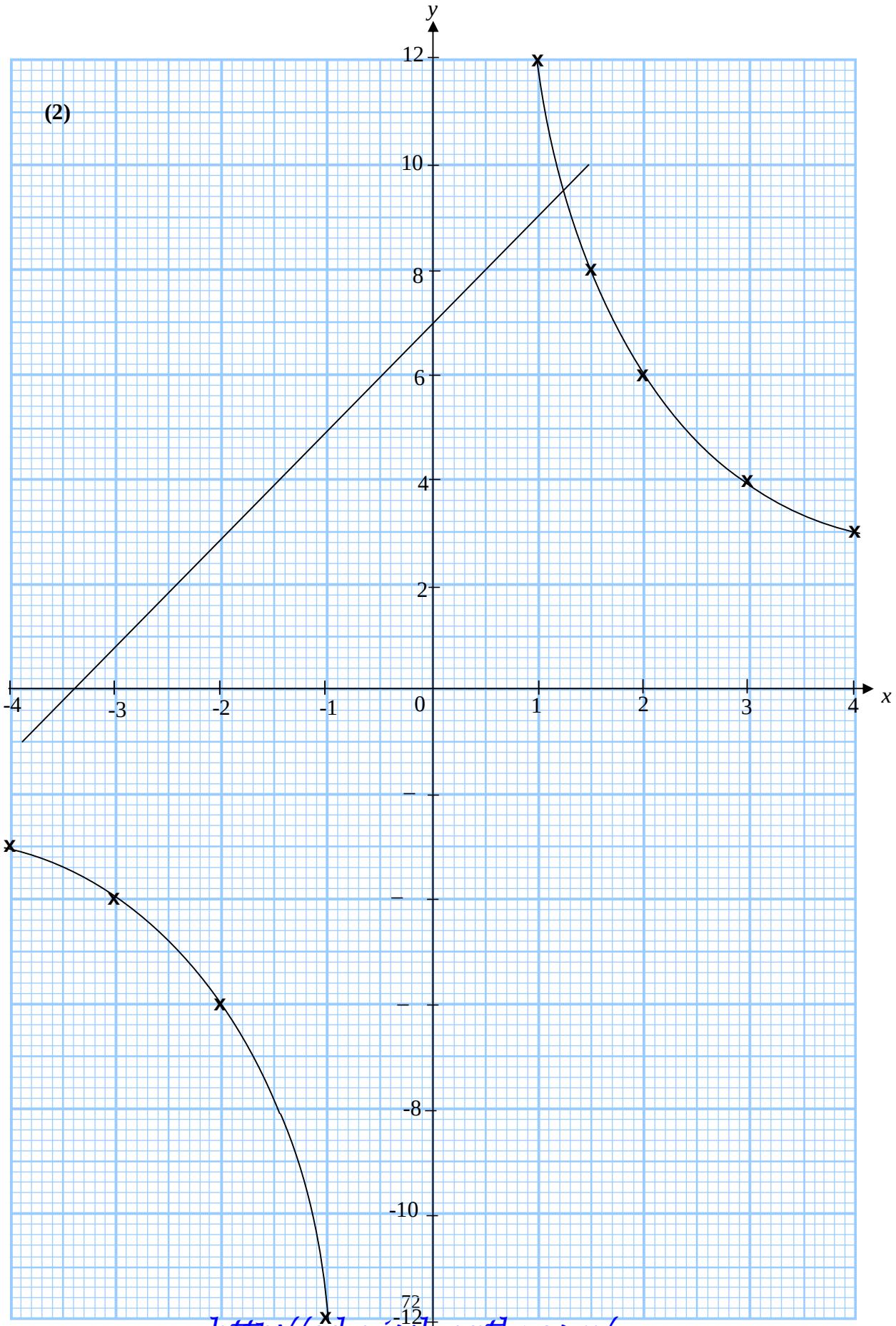
(2)



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Question	Solution and Mark Scheme	Marks	
3(*a*)	11	K1	
	2	K1	**2**
(*b*)	Graph		
	Axes drawn in correct directions uniform scale for $-3 \le x \le 2.5$ and $37 \le y \le -6$	P1	
	All 7 points and *2 points correctly plotted or the curve passes through these points for $-3 \le x \le 2.5$ and $37 \le y \le -6$.	K2	
	A smooth and continuous curve without any straight line and passes through all 9 correct points using the given scale for $-3 \le x \le 2.5$ and $37 \le y \le -6$. Note: 1. 7 or 8 points correctly plotted, award K1 2. Ignore curve out of range.	N1	**4**
(*c*)(i)	$13.1 \le y \le 12.9$	P1	
(ii)	$-2.3 \le x \le -2.1$	P1	**2**
	Note: 1. Allow P marks if values of x and of y are shown on the graph. 2. Values of x and y obtained by calculation, award P0 or from wrong graph, award P0		
(*d*)	Identify equation $y = 5 - 10x$	K1	
	Straight line $y = 5 - 10x$ correctly drawn	K1	
	Values of x :		
	$-3.0 \le x \le -2.9$	N1	
	$-0.5 \le x \le -0.4$	N1	**4**
	Note: 1. Allow N marks if values of x are shown on the graph. 2. Values of x obtained by calculation, award N0		
			12

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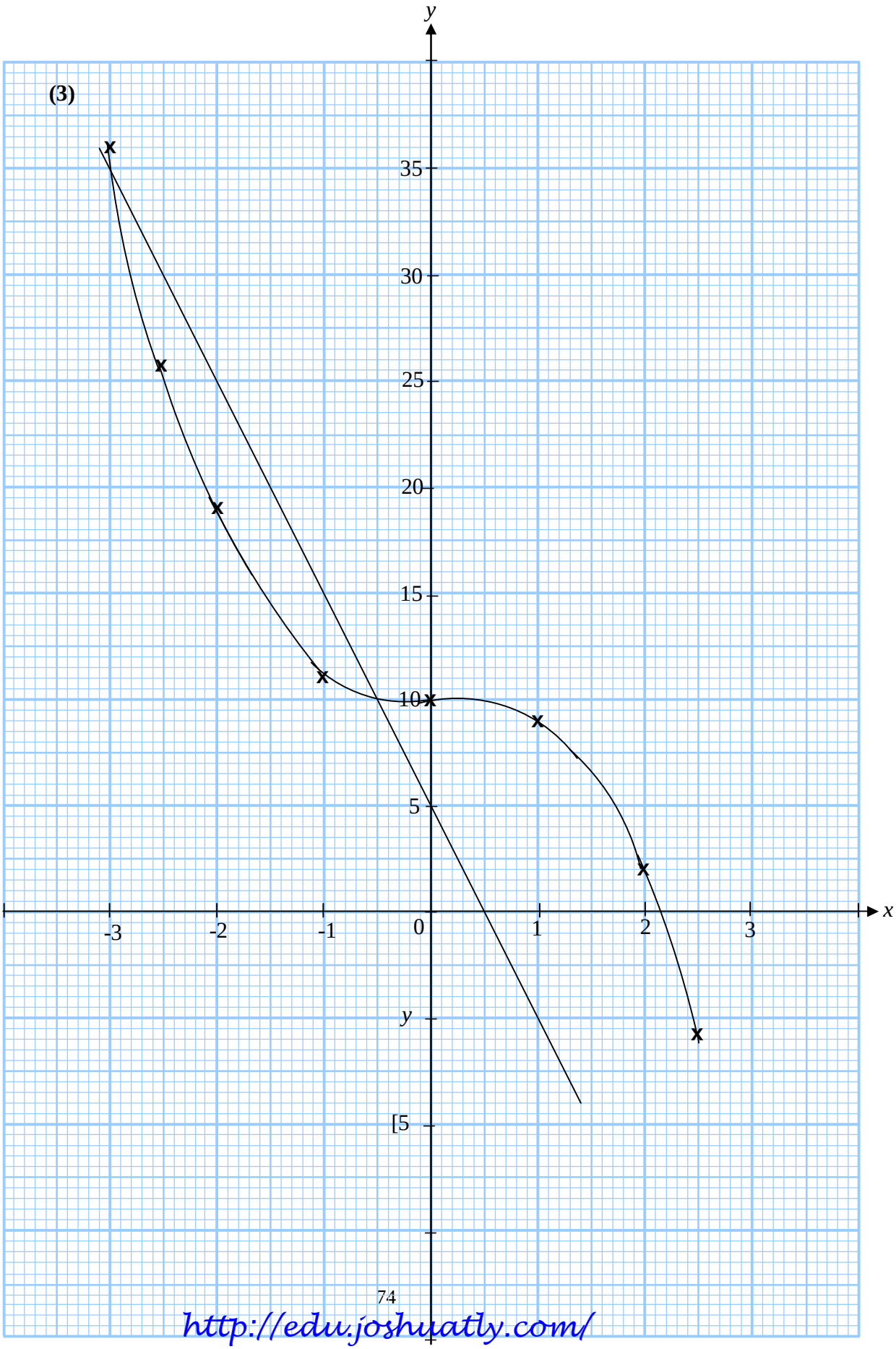
(3)



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Question	Solution and Mark Scheme	Marks	
4(*a*)	2	K1	
	-1.5	K1	**2**
(*b*)	Graph		
	Axes drawn in correct directions uniform scale for $-3 \le x \le 3$ and $6 \le y \le -1$	P1	
	All 7 points and *2 points correctly plotted or the curve passes through these points for $-3 \le x \le 3$ and $6 \le y \le -1$.	K2	
	A smooth and continuous curve without any straight line and passes through all 9 correct points using the given scale for $-3 \le x \le 3$ and $6 \le y \le -1$. Note: 1. 7 or 8 points correctly plotted, award K1 2. Ignore curve out of range.	N1	**4**
(*c*)(i)	$-2.6 \le y \le -2.5$	P1	
(ii)	$-0.7 \le x \le -0.6$	P1	**2**
	Note: 1. Allow P marks if values of x and of y are shown on the graph. 2. Values of x and y obtained by calculation, award P0 or from wrong graph, award P0		
(*d*)	Identify equation $y = -2x - 2$	K1	
	Straight line $y = -2x - 2$ correctly drawn	K1	
	Values of x :		
	$-1.8 \le x \le -1.7$	N1	
	$0.8 \le x \le 0.7$	N1	**4**
	Note: 1. Allow N marks if values of x are shown on the graph. 2. Values of x obtained by calculation, award N0		**12**

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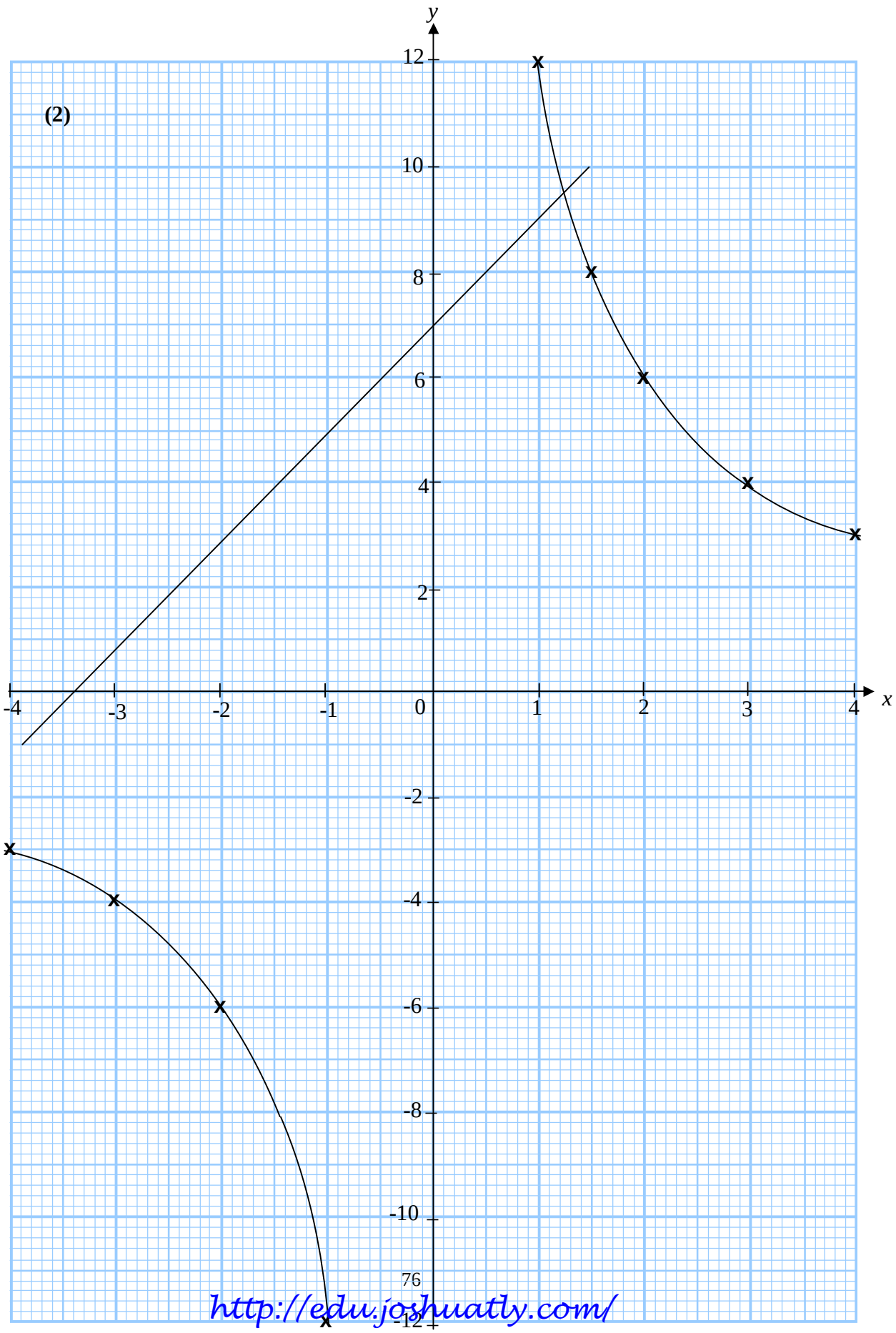
(2)



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Question	Solution and Mark Scheme	Marks	
5(*a*)	13	K1	**2**
	4	K1	
(*b*)	Graph		
	Axes drawn in correct directions uniform scale for $-3 \le x \le 4$ and $20 \le y \le 4$	P1	
	All 7 points and *2 points correctly plotted or the curve passes through these points for $-3 \le x \le 4$ and $20 \le y \le 4$.	K2	**4**
	A smooth and continuous curve without any straight line and passes through all 9 correct points using the given scale for $-3 \le x \le 4$ and $20 \le y \le 4$. Note: 1. 7 or 8 points correctly plotted, award K1 2. Ignore curve out of range.	N1	
(*c*)(i)	$4.2 \le y \le 4.0$	P1	
(ii)	$-1.3 \le x \le -1.2$ $3.3 \le x \le 3.2$	P1 P1	**3**
	Note: 1. Allow P marks if values of x and of y are shown on the graph. 2. Values of x and y obtained by calculation, award P0 or from wrong graph, award P0		
(*d*)	Identify equation $y = -x + 14$ Straight line $y = -x + 14$ correctly drawn	K1	
	Values of x :		
	$-2.55 \le x \le -2.5$	N1	**3**
	$3.55 \le x \le 3.5$	N1	**12**
	Note: 1. Allow N marks if values of x are shown on the graph. 2. Values of x obtained by calculation, award N0		

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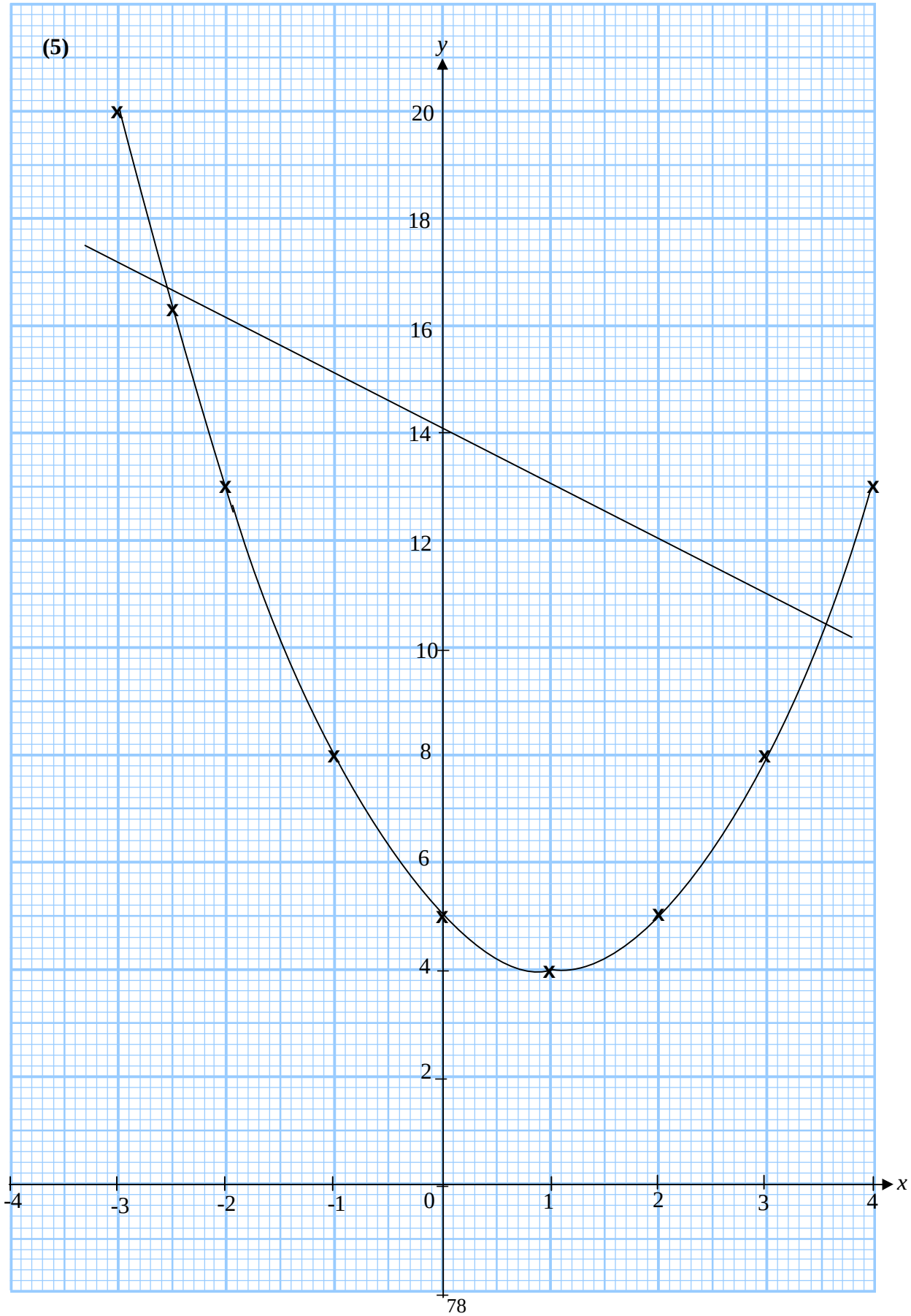
(5)



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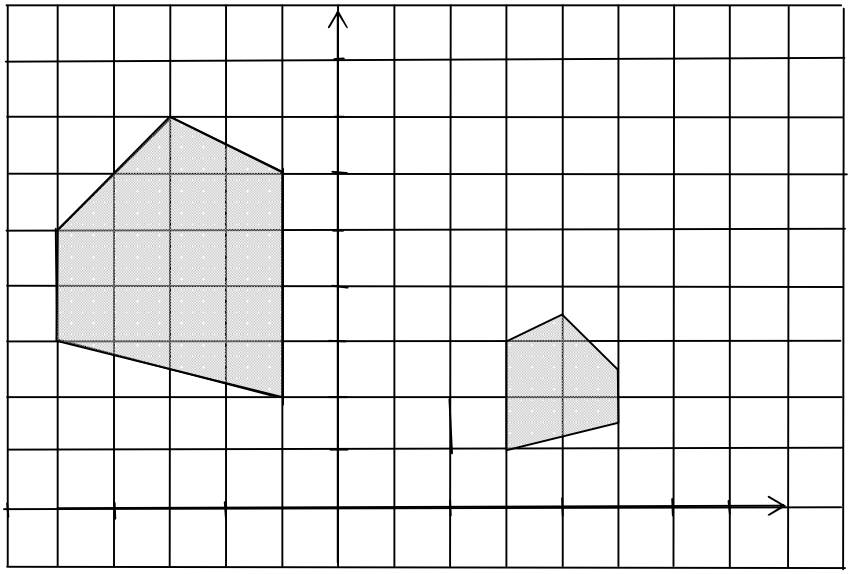
TRANSFORMATION
PENJELMAAN
Paper 2

1. Diagram 1 shows a pentagon PQRST on a Cartesan plane.
Rajah 1 menunjukkan pentagon PQRST pada suatu satah Cartesan.



(a) Transformation P is a reflection on a straight line x = 2. Transformation T is a translation $\begin{pmatrix} -2 \\ -3 \end{pmatrix}$. State the coordinate of the image of point S under the following tranformation :
Penjelmaan P ialah satu pantulan pada garislurus x = 2. Penjelmaan T ialah satu translasi $\begin{pmatrix} -2 \\ -3 \end{pmatrix}$ *Nyatakan koordinat imej bagi titik S di bawah penjelmaan yang berikut :*
(i) PT
(ii) TP

(b) PQRS is the image of ABCD under transformation V followed by transformation W.
PQRS ialah imej bagi ABCD di bawah penjelmaan V diikuti oleh penjelmaan W.
Describe / *Huraikan selengkapnya*
(i) Transformation V / *penjelmaan V,*
(ii) Transformation W / *penjelmaan W.*

(c) Given the area of ABCD is 25 units^2. Calculate the area of PQRST.
Diberi bahawa luas ABCDE ialah 25 unit^2. Hitungkan luas PQRST.

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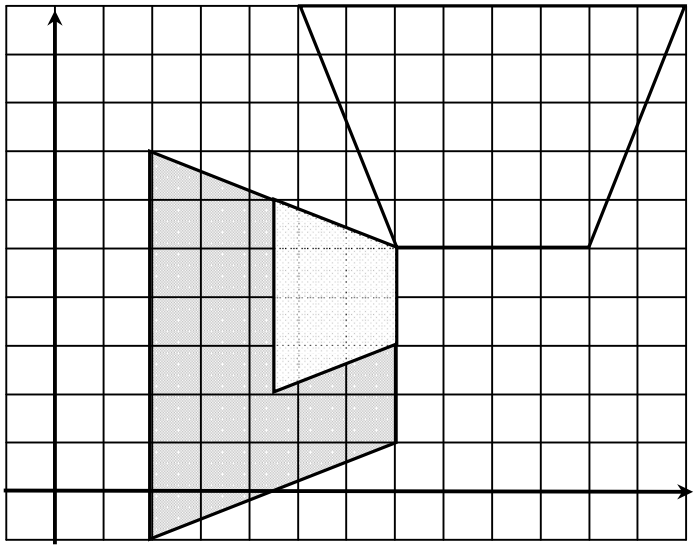
2. Diagram 2 shows rectangles ABCD, PQRS and RTUV.
Rajah 2 menunjukkan sisi empat ABCD, PQRS dan RTUV .



(a) (i) State the image of point T under a translation $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$

Nyatakan imej bagi titik T di bawah translasi $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$

(ii) State the image of point V under a 90^o anticlockwise rotation followed by reflection on perpendicular bisector of line RS.
Nyatakan imej bagi titik V di bawah putaran 90^o lawan arah jam diikuti oleh pantulan pada pembahagidua sama serenjang garis RS.

(b) Given rectangle TUVR is the image of rectangle PQRS under transformation X and ABCR is the image of rectangle TUVR under transformation Y. Describe X and Y.
Diberi sisi empat TUVR ialah imej bagi sisi empat PQRS di bawah penjelmaan X dan ABCR ialah imej bagi sisempat TUVR di bawah penjelmaan Y. Huraikan X dan Y selengkapnya.

(c) Given the area of PQRS is 125 units^2. Calculate the area of shaded region.
Diberi bahawa luas PQRST ialah 125 unit^2. Hitungkan luas kawasan berlorek.

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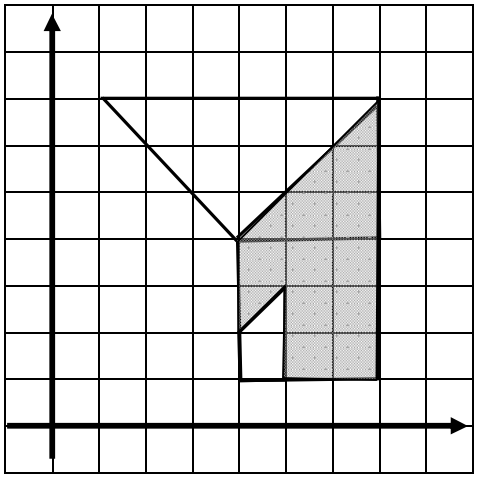
3.(a) Transformation T represent translation $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and transformation R represent 90^{o} rotation anticlockwise about (1 , 3). State the coordinate of image to point (3 , 2) undet the following transformation :

Penjelmaan T mewakili translasi $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ *dan penjelmaan R mewakili putaran 90° lawan arah jam pada pusat (1 , 3). Nyatakan kordinat imej bagi titik (3 , 2) di bawah penjelmaan berikut :*

(i) TR
(ii) RT



(b) In diagram 3 above, rectangle DEFG is the image of rectangle HIJK under transformation P followed by transformation Q.
Dalam rajah 3 di atas , sisiempat DEFG ialah imej bagi sisiempat HIJK dibawah satu penjelmaan P diikuti oleh satu lagi penjelmaan Q.

(i) Describe / Huraikan
(a) transformation / *penjelmaan P*
(b) transformation / *penjelmaan Q*

(ii) Given the area of DEFG is 16 cm^2, find the area of shaded region.
Diberi luas segitiga DEFG ialah 16 cm^2*, cari luas kawasan berlorek.*

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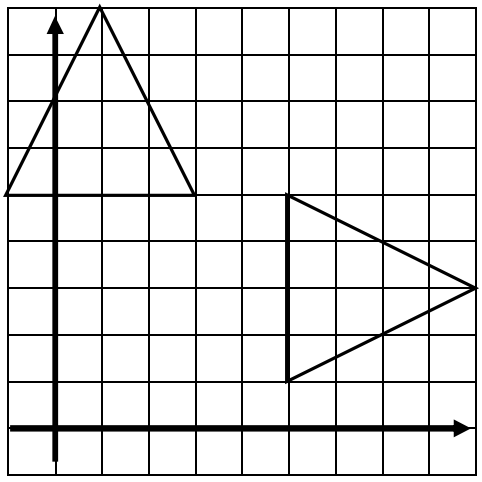
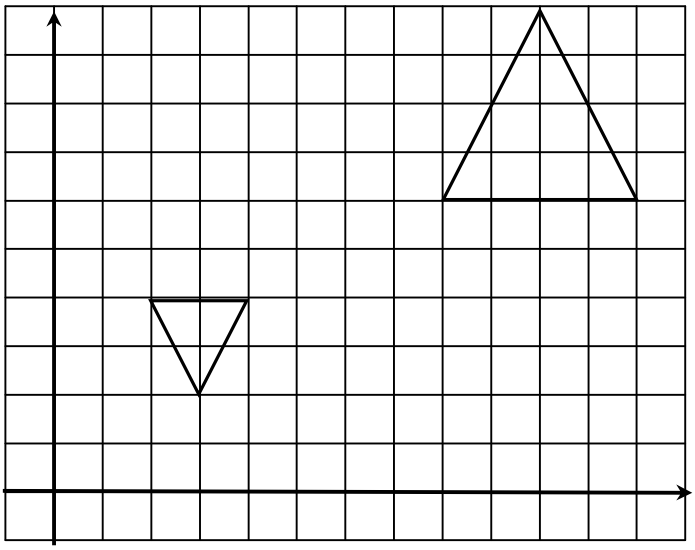
4.(a) Given triangle XYZ is the image of triangle PQR under an anticlockwise rotation
Diberi segitiga XYZ ialah imej bagi segitiga PQR di bawah satu putaran lawan arah jam.

(i) State the centre of the rotation and angle of the rotation.
Nyatakan pusat putaran dan sudut putaran.

(ii) State the coordinate of the image of point Y under translation $\begin{pmatrix} 2 \\ -5 \end{pmatrix}$ followed by reflection on line PR.
Nyatakan koordinat imej bagi titik Y di bawah traslasi $\begin{pmatrix} 2 \\ -5 \end{pmatrix}$ *diikuti oleh pantulan pada garis PR.*



b) Diagram 4 shows triangle RST and ABC on a Cartesan plane.
Rajah 4 menunjukkan segitiga RST dan ABC di atas satah Cartesan.



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(i) Triangle RST is the image of triangle ABC under transformation P followed by transformation Q. Describe transformation P and transformation Q.
Segitiga RST ialah imej segitiga ACB di bawah penjelmaan P diikuti oleh penjelmaan Q. Huraikan selengkapnya penjelmaan P dan penjelmaan Q.

(ii) Given the area of triangle ABC is 18 units^2, calculate the area of the image.
Diberi luas segitiga ABC ialah 18 unit^2, hitungkan luas imejnya.

5. (a) Transformation *R* is a 90° clockwise rotation about (2 , 1). Transformation *T* is a translation $\begin{pmatrix} 2 \\ -4 \end{pmatrix}$.
Penjelmaan R ialah putaran 90° ikut arah jam pada pusat (2, 1). Penjelmaan T ialah translasi $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$.

State the coordinate of the image of point (6 , 4) under the following transformation
Nyatakan koordinat imej bagi titik (6 , 4) di bawah penjelmaan berikut:
(i) R^2.
(ii) *RT*.

(b) Diagram 5 shows pentagon JKLMN, PQRST and VWXYZ, drawn on a Cartesan plane.
Rajah 5 menunjukkan pentagon JKLMN, PQRST dan VWXYZ dilukis di atas satah Cartesan.

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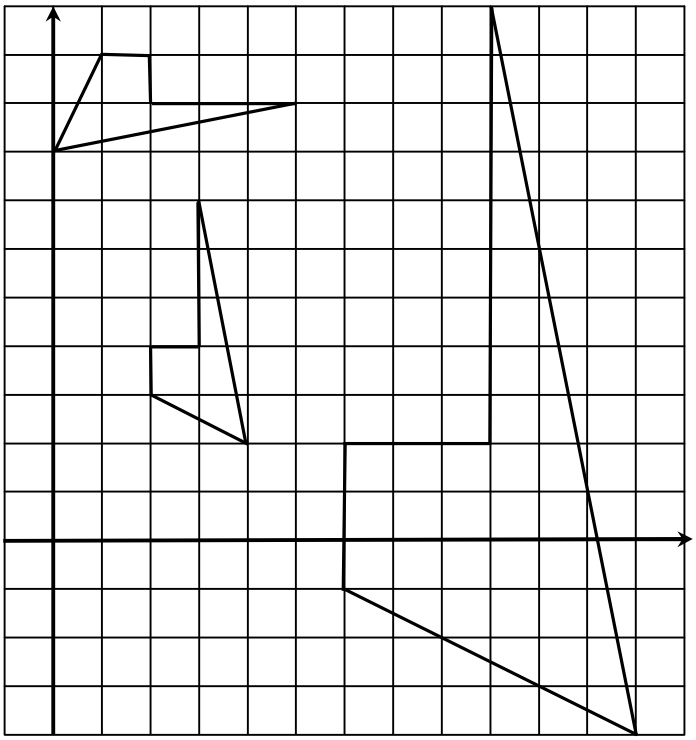

Diagram 5 / *Rajah 5*

PQRST is the image of JKLMN under transformation A and VWXYZ is the image of PQRST under another transformation B. Describe :
PQRST ialah imej bagi JKLMN bagi satu penjelmaan A dan VWXYZ ialah imej PQRST bagi satu penjelmaan B. Huraikan selengkapnya:

(i) Trasformations A and B.
Penjelmaan A dan B.

(ii) Given the area of JKLMN is 14 unit^2 , calculate the area of VWXYZ.
Diberi luas *JKLMN* ialah 14 unit^2, hitungkan luas VWXYZ.

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	Answer / *Jawapan*	**Mark /*Markah***
1.	(a) (i) (7, 3) *Note* : If (-3, 3) seen or marked on graph give 1 mark. (ii) (3, 3) *Note* : If ,(5, 6) seen or marked on graph ive 1 mark. (b) (i) reflection on line x = 1 *Note* : reflection seen award 1mark (ii) enlargement scale factor 2 at (-1, 0). *Note* : enlargement scale factor 2 or enlargement at (-1, 0)award 2 marks. Enlargement seen award 1 mark. (c) $\frac{25}{\left(\frac{1}{2}\right)^2}$ = 100	2 2 2 3 2 1 **12**
2.	(a)(i) R (ii) R *Note* : S seen or marked award 1 mark. (b) X : rotation 90° anticlockwise about (11, 1) *Note* : rotation 90° anticlockwise or rotation 90° about (11, 1) award 2 mark. rotation award 1 mark. Y : enlargement scale factor $\frac{1}{2}$ at R *Note* : enlargement scale factor $\frac{1}{2}$ or enlargement at R award 2 mark. enlargement award 1 mark. (c) $\left(\frac{1}{2}\right)^2 \times 120$ $120 - \left(\frac{1}{2}\right)^2 \times 120$ 90	1 2 3 3 1 1 1 **12**
3.	(a)(i) (0, 8) *Note* : (2, 5) seen or marked award 1 mark. (ii) (-1, 3)	2 2

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	Note : (1, 5) seen or mark award 1 mark.	
	(b) (i) P : Rotation 90^o clockwise about (4, 4)	3
	Note : rotation 90^o clockwise or rotation 90^o about (4, 4) award 2 mark. rotation award 1 mark.	
	Q : Enlargement scale factor $\frac{1}{3}$ at (4, 1)	3
	Note : enlargement scale factor $\frac{1}{3}$ or enlargement at R award 2 mark. enlargement award 1 mark.	
	(ii) $\frac{16}{\left(\frac{1}{3}\right)^2}$	1
	144	1 **12**
4.	(a)(i) (2, 2)	1
	90^o	1
	(ii) (7, 4)	2
	Note : (4, 5) seen or mark award 1 mark.	
	(b)(i) reflection at point (7, 5) or rotation 180^o about (7, 5)	3
	Note : reflection or rotation 180^o award 1 mark.	
	Enlargement scale factor $\frac{1}{2}$ at S	3
	Note : enlargement scale factor $\frac{1}{2}$ or enlargement at S award 2 mark. enlargement award 1 mark.	
	(ii) $\left(\frac{1}{2}\right)^2 \times 18$	1
	4.5	1 **12**
5.	(a)(i) (-2, -2)	2
	Note : (5, -3) seen or mark award 1 mark.	
	(ii) (1, -6)	2
	Note : (8, 0) seen or mark award 1 mark.	
	(b) (i) A : Rotation 90^o anticlockwise about (5, 7)	3
	Note : rotation 90^o anticlockwise or rotation 90^o about (5, 7) award 2 mark.	

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	rotation award 1 mark. B : Enlargement scale factor 3 at (0, 5) *Note* : enlargement scale factor 3 or enlargement at (0, 5) award 2 mark. enlargement award 1 mark. (ii) 3^2 x 14 126	3 1 1 **12**

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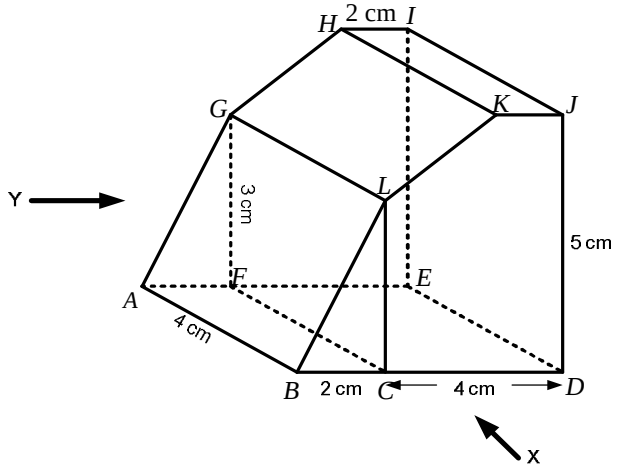
PLAN AND ELEVATION

1 *You are* **not** *allowed to use graph paper to answer these questions.*

(*a*) Diagram shows a solid right prism with rectangular base *ABCDEF* on a horizontal plane.The surface *BCDJKLE* is the uniform cross-section of the prism. *LC* and *JD* are vertical edges. Rectangle *ABLG and HKLG* is an inclined plane.
Rajah menunjukkan sebuah pepejal berbentuk prisma tegak dengan tapak segi empat tepat ABCDEF terletak di atas satah mengufuk.Permukaan BCDJKLE ialah keratan rentas seragam prisma itu. LC dan JD adalah tegak.Segi empat tepatABLG dan HKLG ialah satah condong.



Draw to full scale,
Lukis dengan skala penuh,

(i) the plan of the solid,
pelan gabungan pepejal itu.

(ii) the elevation of the composite solid on the vertical plane parallel to *AB* as viewed from ***Y*** .
dongakan gabungan pepejal itu pada satah mencancang yang selari dengan AB sebagaimana dilihat dari Y

(ii) the elevation of the combined solid on the vertical plane as viewed from ***X***
dongakan gabungan pepejal itu pada satah mencancang yang selari dengan BD sebagaimana dilihat dari X.

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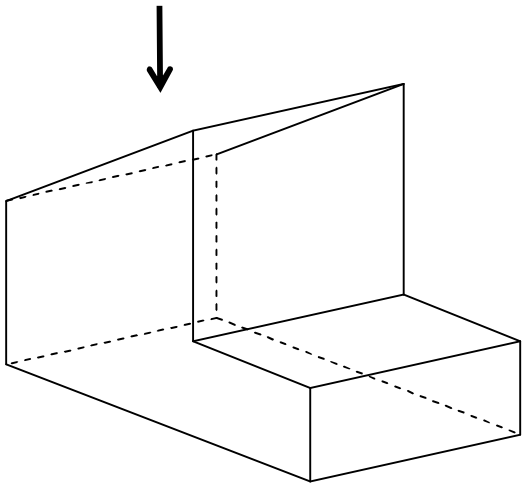
2 Diagram shows a solid right prism with retangular base *JKLM* on a horizontal plane.The surface *EJKHFG* is the uniform cross section of the prism. Rectangle *EGPQ* is an incline plane and rectangle *FHRS* is a horizontal plane. *EJ*, *GF* and *HK* are vertical edges.

Rajah menunjukkan sebuah pepejal berbentuk prisma tegak dengan tapak segiempat tepat JKLM terletak di atas meja mengufuk. Permukaan EJKHFG ialah keratan rentas seragamnya. Segiempat tepat EGPQ ialah satah condong. Segiempat tepat FHRS ialah satah mengufuk. Tepi EJ , GF dan HK adalah tegak.

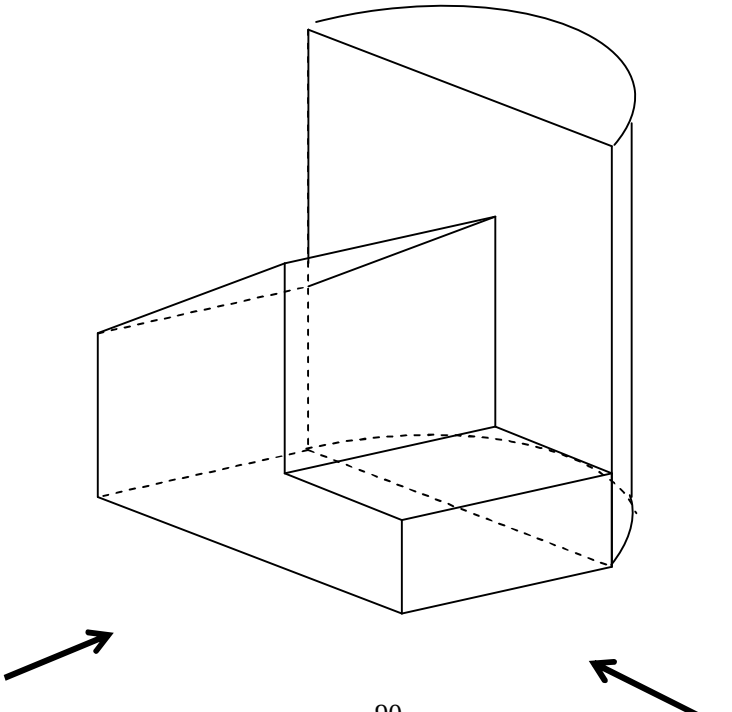


(a) Draw to full scale, the plane of the solid

Lukis dengan skala penuh ,pelan pepejal itu.

(b) Diagram below shows a solid half cylinder is joined to the prism at the vertical plane *LRSPQM*. *JKLVM* is a horizontal plane.

Sebuah pepejal yang berbentuk separuh silinder dicantumkan kepada prisma pada satah LRSPQM untuk membentuk sebuah pepejal gabungan . JKLVM ialah satah mengufuk.



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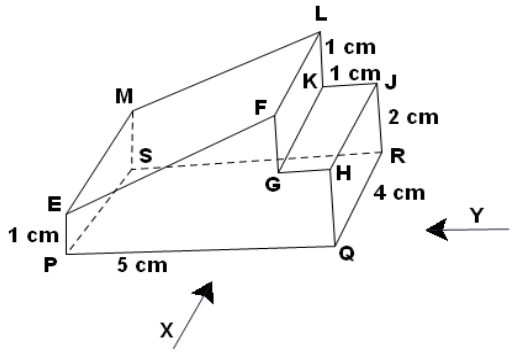
b) Draw to full scale
Lukiskan dengan skala penuh,

(i) The elevation of the combined solid on a vertical plane parallel to *JK* as viewed from *X*.
Dongakan pepejal gabungan itu pada satah mencancang yang selari dengan JK sebagaimana dilihat dari X

(ii) The elevation of the combined solid on a vertical plane parallel to *KL* as viewed from *Y*
Dongakan pepejal gabungan itu pada satah mencancang yang selari dengan KL sebagaimana dilihat dari Y.

3 Diagram below shows a solid right prism with the rectangular base, *PQRS*, resting on a horizontal table. *EFGHQP* is the uniform cross section of the prism. Rectangle *EFLM* is an inclined plane. Rectangle *GHJK* is a horizontal plane. *EP, FG* and *HQ* are vertical edges.
Sebuah pepejal yang berbentuk kuboid dicantumkan kepada prisma pada satah PQRS untuk membentuk sebuah pepejal gabungan . EFGHQP ialah keratan rentas. EFLM ialah satah condong. Segi empat GHJK ialah satah mengufuk.EP,FG, dan HQ adalah tegak.



Draw the full scale plan of the solid.
Lukiskan dengan skala penuh

3 (b) A solid cuboid is joined to the prism in diagram below at the vertical plane, *MSUZ*. The combined solid is shown below .The base *PQRUVWS*, is on a horizontal plane

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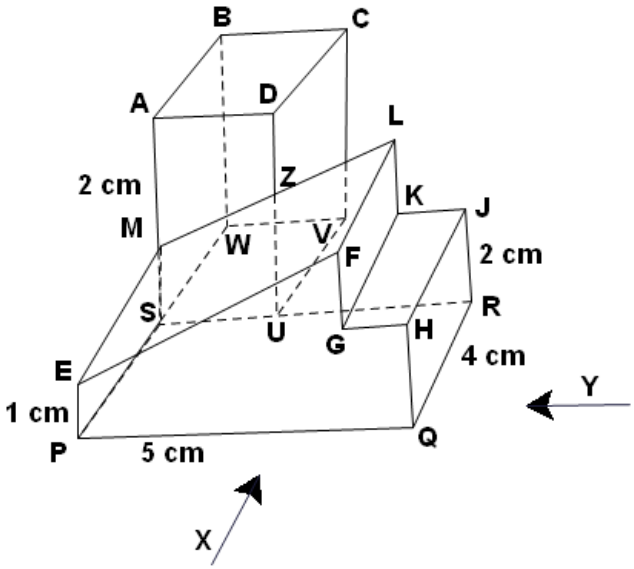
and $AB = BC = 2$ cm.

Rajah di bawah menunjukkan sebuah pepejal berbentuk prisma tegak dengan tapak segiempat tepat PQRS terletak di atas meja mengufuk. Permukaan EFGHQP ialah keratan rentas seragamnya. Segiempat tepat EFLM ialah satah condong. Segiempat tepat GHJK ialah satah mengufuk.Tepi EJ , GF dan HK adalah tegak



Draw the full scale

Lukiskan dengan skala penuh,

(i) elevation of the combined solid on a vertical plane parallel to *PQ* as viewed from *X*
dongakan pepejal gabungan itu pada satah mencancang yang selari dengan PQ sebagaimana dilihat dari X

(ii) elevation of the combined solid on a vertical plane parallel to *QR* as viewed from *Y*
dongakan pepejal gabungan itu pada satah mencancang yang selari dengan QR sebagaimana dilihat dari Y

4 (a) Diagram shows a solid prism with its rectangular base, PQRS, on a horizontal table. The surface, FGKLRQ, is the uniform cross-section of the prism. Rectangle EFGH is an

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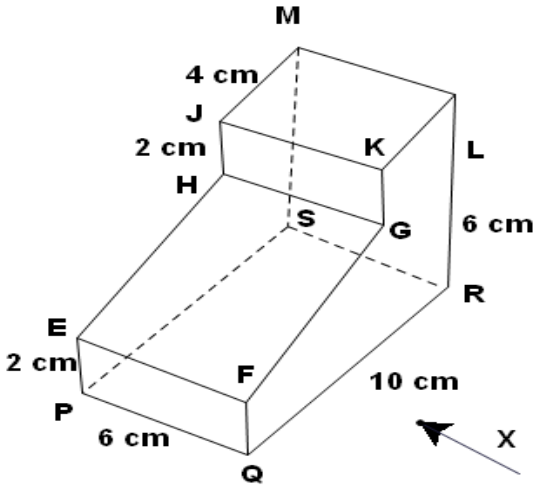
inclined plane and rectangle JKLM is a horizontal plane. FQ, KG and LR are vertical edges.

Rajah di bawah menunjukkan sebuah pepejal berbentuk prisma dengan tapak segiempat tepat PQRS terletak di atas meja mengufuk. Permukaan EFKLRQ ialah keratan rentas seragamnya. Segiempat tepat EFGH ialah satah condong dan segiempat tepat JKLM ialah satah mengufuk.Tepi FQ , KG dan LR adalah tegak



Draw the full scale of elevation of the solid on a vertical plane parallel to *QR* as viewed from *X*.

Lukis dengan skala penuh, dongakan pepejal di atas satah condong selari dengan QR sebagaimana dilihat dari X.

(b) A solid right prism with the uniform cross-section, *ITU*, is removed from the solid. The remaining solid is shown in the diagram below. Rectangle *TFVU* is a horizontal plane. *IU* is a vertical edge. *FT* = 3 cm and *IU* = 2 cm.

Sebuah pepejal berbentuk prisma dengan keratan rentas ITU,dikeluarkan daripada pepejal.Pepejal yang tinggal adalah seperti rajah di bawah.Segiempat TFVU ialah satah mengufuk.IU tepi tega. FT = 3 cm dan IU = 2 cm

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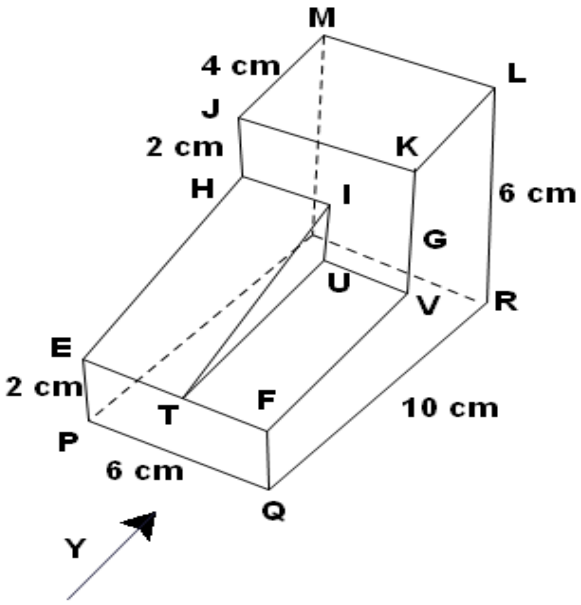

Draw the full scale
Lukis dengan skala penuh,

(i) plan of the remaining solid
pelan pepejal yang tinggal

(ii) elevation of the remaining solid on a vertical plane parallel to PQ as viewed from Y.
dongakan pada pepejal yang tinggal pada satah condong selari dengan PQ sebagaimana yang dilihat dari Y

5 (*a*) Diagram shows a solid right prism with rectanglular base *FGRQ* on a horizontal plane. *EFGHJKLM* is the uniform cross-section of the prism. Rectangles *EMNP*, *LKUV* and *JHST* are horizontal planes.*FE* , *LM* , *KJ* and *GH* are vertical edges. *EM* = *LK* = *JH* = 2 cm.
Rajah di bawah menunjukkan sebuah pepejal berbentuk prisma tegak dengan tapak segiempat tepat FGRQ terletak pada satah mengufuk. EFGHJKLM ialah keratan rentas seragamnya. Segiempat tepat EMNP, LKUV dan JHST ialah satah mengufuk..Tepi FE , LM , KJ dan GH adalah tegak.EM = LK = JH = 2 cm.

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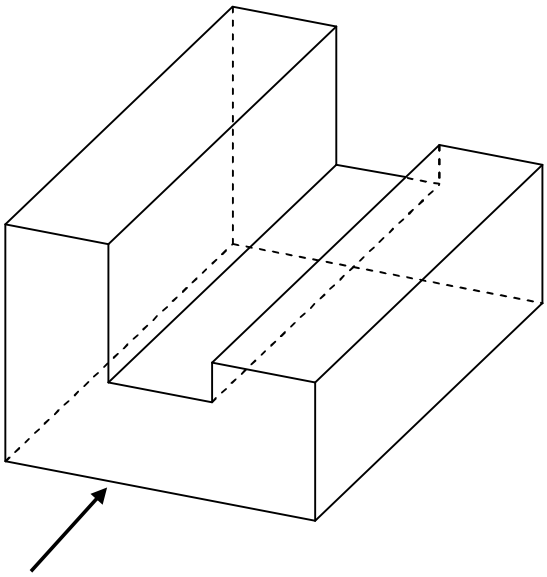

Draw full scale, the elevation of the solid on a vertical plane parallel to *FG* as viewed from ***A***.
Lukis dengan skala penuh, dongakan pepejal di atas satah condong selari dengan FG sebagaimana dilihat dari ***A***.

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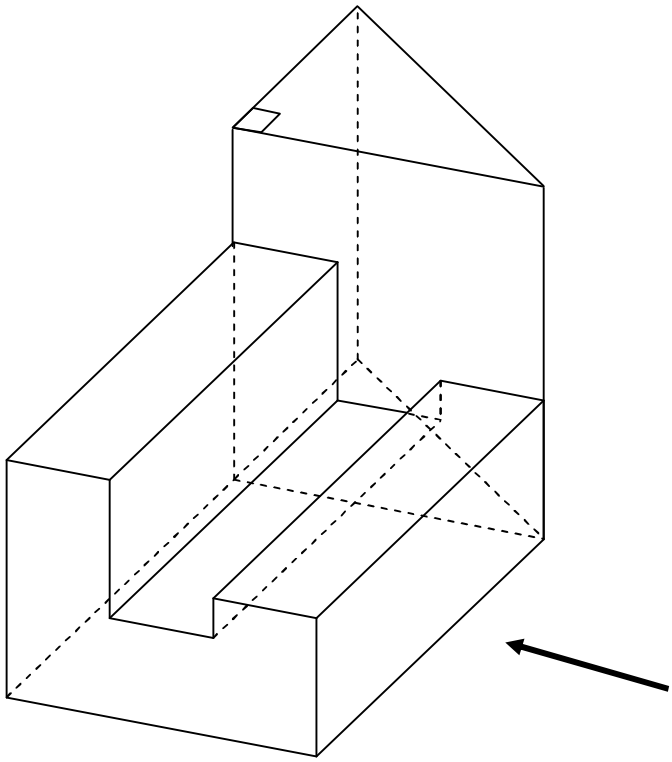

(*b*) Another solid right prism is joined to the solid in diagram above at the vertical plane *PQRSTUVN* . The combined solid is shown in the above diagram . Right-angled triangle *XYZ* is its uniform cross-section of the prism.The base *FGRWQ* lies on a horizontal plane and *FQW* is a straighf line.
Satu lagi prisma tegak dicantum pada pepejal dalam rajah di atas pada satah condong PQRSTUVN.Gabungan pepejal itu ditunjukkan pada rajah di atas.Segitiga tepat XYZ adalah keratan rentas prisma itu.Tapak FGRWQ terletak pada satah mengufuk dan FQW adalah garis lurus.

Draw to full scale,
Lukis pada skala penuh

(i) the plan of the combined solid,
pelan bagi gabungan pepejal itu

(ii) the elevation of the combined solid on a vertical plane parallel to *GR* as viewed from ***B*** .
dongakan pada pepejal gabungan pada satah condong selari dengan GR sebagaimana dilihat pada B

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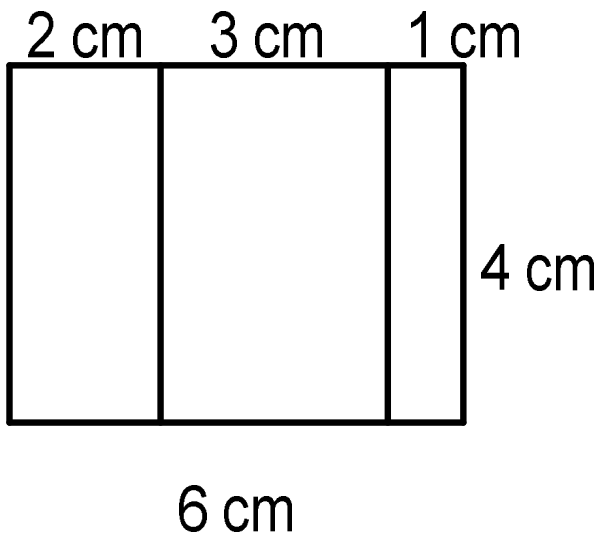
Question	Solution and Mark Scheme	Marks	
1(*a*)			
	Correct shape with rectangles *AGHIJKLB*. All solid lines.	K1	
	AG > *GH* > *HI* = *JK*	K1	
	Measurements correct to ± 0.2 cm (one way) and all angles at vertices of rectangles is $90^o \pm 1^o$	N1	**3**

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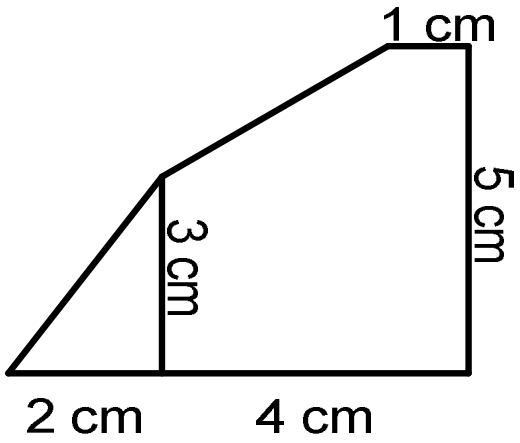
Question	Solution and Mark Scheme	Marks	
(*b*)			
	Correct shape with trapezium *LKJDC* and triangle *LBC* All solid lines.	K1	
	$JD > CD > LB > CL = LK > KJ$	K1	
	Measurements correct to $\pm$ 0.2 cm (one way) and $\angle C, \angle D, \angle J = 90^o \pm 1^o$	N2	
			4

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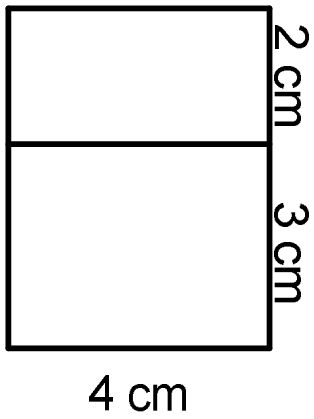
Question	Solution and Mark Scheme	Marks	
(*c*)			
	Correct shape with rectangles *JBGL* and *GLKH*. All solid lines.	K1	
	BQ > *QP* > *AB* = *EH* > *QM* = *LB* > *AE* = *BH* = *HJ* > *JL*	K2	
	Measurements correct to ± 0.2 cm (one way) and all angles at vertices of rectangles = $90^o \pm 1^o$	N2	**5**
			12

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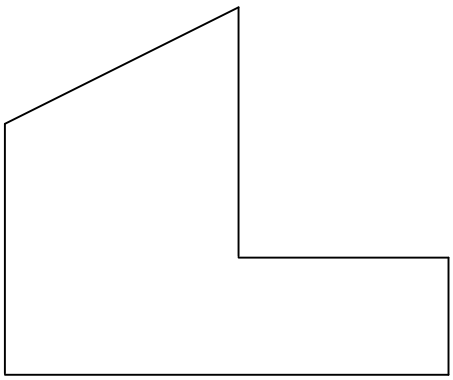
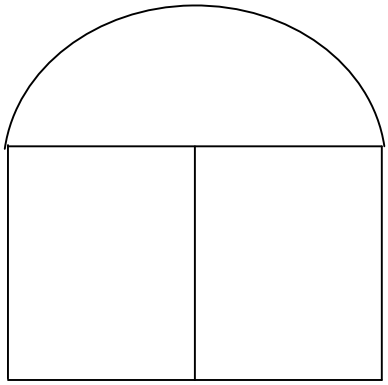
Question	Solution and Mark Scheme	Marks	
2(*a*)			
	Bentuk kelihatan betul dengan, semua garis penuh.	K1	
	Ukuran betul sehingga ± 0.2 cm (sehala) dan sudut disemua bucu segiempat tepat= $90^o \pm 1^o$	K1	
		N1	**3**
	(b) (i) **Dongakan dari X** 		
	Bentuk kelihatan betul dengan heksagon *MPQRSHGJ*, segiempat tepat *MPGJ*, *PQRS* dan segitiga *GSH* ,semua garis penuh.	K1	
	QR > RH, RS = SH = MJ > GJ	K1	
	Ukuran betul sehingga ± 0.2 cm sehala dan sudut disemua bucu segiempat tepat = $90^o \pm 1^o$	N2	

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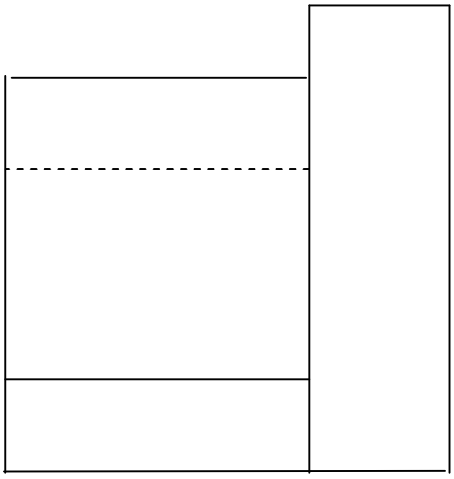
	(ii) **Dongakan dari Y**  Bentuk kelihatan betul dengan segiempat tepat semua garis penuh. disambung dengan garis putus-putus. EA > AB > BP > PM >MH Ukuran betul sehingga ± 0.2 cm sehala dan sudut disemua bucu segiempat tepat = $90^o \pm 1^o$	K1 K1 K1 N2	**12**
Question	**Solution and Mark Scheme**	**Marks**	

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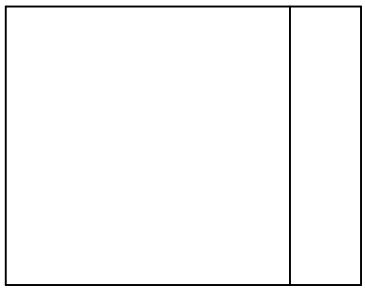
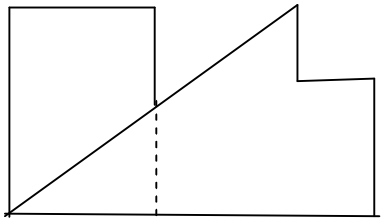
3(*a*)	 Bentuk kelihatan betul dengan, semua garis penuh. $FK > KL > ET = TF$ Ukuran betul sehingga ± 0.2 cm (sehala) dan sudut disemua bucu segiempat tepat= $90^o \pm 1^o$	K1 K1 N1	**3**
b)(i)	 Bentuk kelihatan betul dengan heksagon *MPQRSHGJ*, segiempat tepat *MPGJ*, *PQRS* dan segitiga *GSH* ,semua garis penuh. QR > RH, RS = SH = MJ > GJ Ukuran betul sehingga ± 0.2 cm sehala dan sudut disemua bucu segiempat tepat = $90^o \pm 1^o$	K1 K1 N2	**4**

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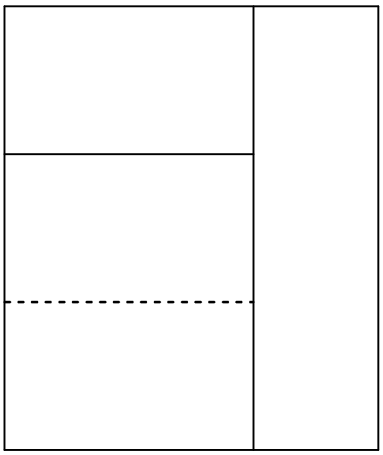
b)(ii)	 Bentuk kelihatan betul dengan segiempat tepat semua garis penuh. disambung dengan garis putus-putus. EA > AB > BP > PM >MH Ukuran betul sehingga ± 0.2 cm sehala dan sudut disemua bucu segiempat tepat = $90^o \pm 1^o$	K1 K1 K1 N2	**5** **12**

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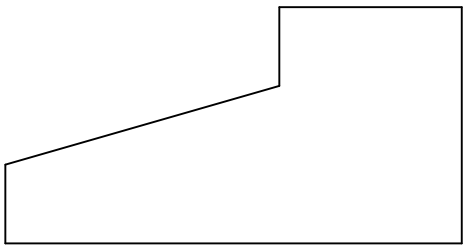
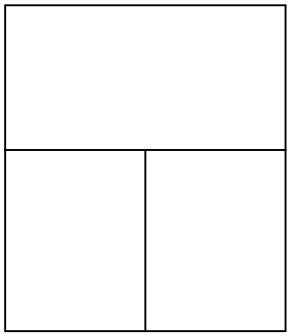
Question	Solution and Mark Scheme	Marks	
4(*a*)			
	Bentuk kelihatan betul dengan, semua garis penuh.	K1	
	$FK > KL > TF = ET$	K1	
	Ukuran betul sehingga ± 0.2 cm (sehala) dan sudut disemua bucu segiempat tepat= $90^o \pm 1^o$	N1	**3**
b)(i)			
	Bentuk kelihatan betul dengan heksagon *MLKFTEJ* segiempat tepat *MLKJ*, *KITF* dan *ITEJ* ,semua garis penuh.	K1	
	FK > KL > TF=ET	K1	
	Ukuran betul sehingga ± 0.2 cm sehala dan sudut disemua bucu segiempat tepat = $90^o \pm 1^o$	N2	**4**

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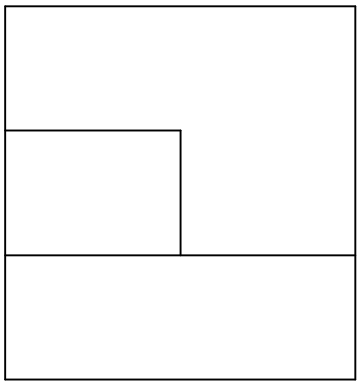
b)(ii)	 Bentuk kelihatan betul dengan segiempat tepat semua garis penuh. KV > VF, VF = FQ, HE > JH > EP Ukuran betul sehingga ± 0.2 cm sehala dan sudut disemua bucu segiempat tepat = $90^o \pm 1^o$	K1 K2 N2	**5** **12**

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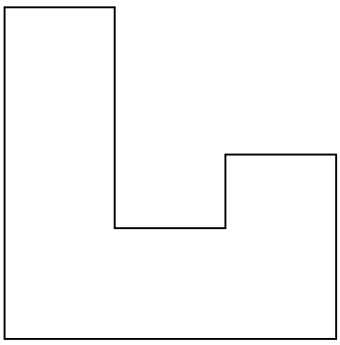
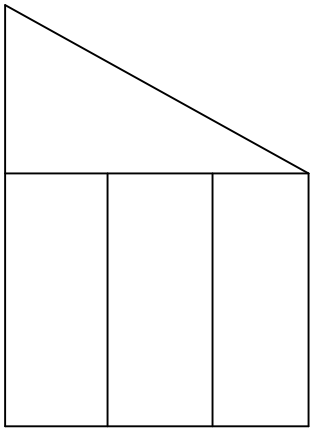
Question	Solution and Mark Scheme	Marks	
5(*a*)			
	Bentuk kelihatan betul dengan, semua garis penuh.	K1	
	$EF > FG > GH > JK$	K1	
	Ukuran betul sehingga ± 0.2 cm (sehala) dan sudut disemua bucu segiempat tepat= $90^o \pm 1^o$	N1	**3**
b)			
	Bentuk kelihatan betul dengan heksagon *XYEMJHZTN* segiempat tepat *EYNM, MNTJ* dan segitiga *XYZ* ,semua garis penuh.	K1	**4**
	YE > *EM* =*MJ*=*JH*, XZ > XY	K1	
	Ukuran betul sehingga ± 0.2 cm sehala dan sudut disemua bucu segiempat tepat = $90^o \pm 1^o$	N2	

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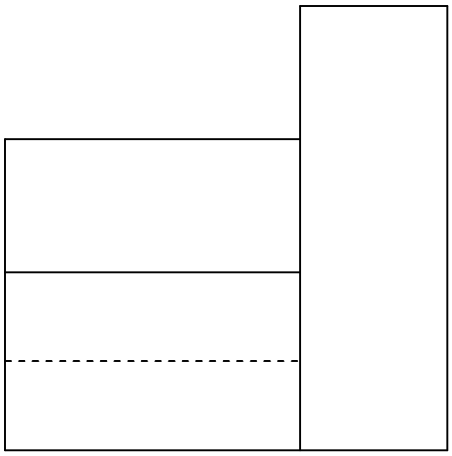
b)(ii)			
	Bentuk kelihatan betul dengan segiempat tepat semua garis penuh.	K1	**5**
	KU disambung dengan garis putus-putus.	K1	
	$XW > WR$, $MG > GR$, $GS = SM$	K1	
	Ukuran betul sehingga ± 0.2 cm sehala dan sudut disemua bucu segiempat tepat = $90^o \pm 1^o$	N2	**12**

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STATISTICS

1 Table 16(i) shows the frequency distribution of the payment, in RM, by 80 drivers at a toll booth.
Jadual 16(i) *menunjukkan taburan kekerapan bayaran, dalam* RM, *oleh* 80 *pemandu di sebuah pondok tol*.

Class interval ***Selang kelas***	**Frequency** ***Kekerapan***
15 – 19	3
20 – 24	7
25 – 29	15
30 – 34	20
35 – 39	21
40 – 44	10
45 – 49	4

Table 16(i)
Jadual 16(i)

(*a*) (i) State the modal class.
Nyatakan kelas mod.

(ii) Calculate the estimated mean of the toll paid by a driver.
Hitung min anggaran bayaran bagi seorang pemandu.

[4*marks*]
[4 *markah*]

.

(*b*) Based on Table 16(i), complete Table 16(ii) in the answer space.
Berdasarkan Jadual 16(i), *lengkapkan Jadual* 16(ii) *pada ruang jawapan*.

[3 *marks*]
[3*markah*]

(*c*) For this part of the question, use the graph paper provided on page 33.
Untuk ceraian soalan ini, gunakan kertas graf yang disediakan di halaman 33
By using the scale of 2 cm to 5 RM on the horizontal axis and 2 cm to 10 drivers on the vertical axis, draw an ogive for the data.
Dengan menggunakan skala 2 cm *kepada* 5 RM *pada paksi mengufuk dan* 2 cm *kepada* 10 *pemandu pada paksi mencancang, lukis satu ogif bagi data tersebut*.

[4 *marks*]
[4 *markah*]

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(*d*) Based on the ogive in 16 (*c*), state the number of drivers who paid more than RM 45 for the toll
Berdasarkan ogif di 16(*c*), *nyatakan bilangan pemandu yang telah membuat bayaran tol lebih daripada* RM 45.

[1 *marks*]
[1 *markah*]

Answer / *Jawapan* **:**

(*a*) (i)

(ii)

(*b*)

Upper Boundary ***Sempadan Atas***	**Cumulative Frequency** ***Kekerapan Longgokan***
14.5	0
19.5	

Table 16(ii)
Jadual 16ii)

(*c*) Refer graph on page 33
Rujuk graf di halaman 33

(*d*)

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2 The data in Diagram 7 shows the marks for an English Language monthly test for 42 pupils.

49	36	38	39	41	45	45
43	54	30	33	39	45	43
40	38	35	34	34	25	34
46	53	35	37	40	38	48
25	44	47	30	29	28	42

DIAGRAM 7

(a) Using data in Diagram 7, and class interval of 5 marks, complete Table answer space.

[4 *marks*]

(*b*) *For this part of the question, use the graph paper provided on page 38* . By using a scale of 2 cm to 5 marks on the horizontal axis and 2 cm to 5 pupil on the vertical axis, draw an ogive based on the data.

[6 *marks*]

(*c*) From your ogive in (b)

(i) find the first quartile,

(ii) hence, explain briefly the meaning of the first quartile.

[2 *marks*]

Answer:

(*a*)

Class interval	Frequency	Cumulative Frequency
21 - 25		
26 - 30		

TABLE 3

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(*b*) *Refer graph on page 38* .

(*c*) (i)

(ii)

3 The data in Diagram 14 shows the marks obtained by a group of 32 students in a test.

Data dalam Rajah 14 *menunjukkan markah yang diperoleh sekumpulani* 32 *orang murid dalam satu ujian*.

75	45	56	51	98	73	76	55
78	48	65	54	62	80	65	53
70	58	84	75	42	76	60	34
79	89	84	71	36	71	85	68

Diagram 14
Rajah 14

(a) Based on the data in Diagram 14, complete Table 14 in the answer space on page **28**.

[4 marks]

Berdasarkan data di Rajah 14, *lengkapkan Jadual* 14 *di ruang jawapan pada halaman* **26**.

[4*markah*]

(*b*) Calculate the estimated mean marks of the group of students.

[4 marks]

Hitung min anggaran markah bagi kumpulan murid itu . [4 *markah*]

(*c*) For this part of the question, use the graph paper provided on page **29**.

Untuk ceraian soalan ini, gunakan kertas graf yang disediakan di halaman **29**.

By using the scale of 2 cm to 10 marks on the horizontal axis and 2 cm to 1 student on the vertical axis, draw a histogram for the data.

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[4 *marks*]

Dengan menggunakan skala 2 cm *kepada* 10 *markah pada paksi mengufuk dan* 2 cm *kepada* 1 *murid pada paksi mencancang, lukis satu histogram bagi data tersebut.*

[4 *markah*]

(*d*) State one information about the marks based on the histogram in 14(*c*).

[1 *marks*]

Nyatakan satu maklumat tentang markah berdasarkan histogram di **14**(*c*).

[1 *markah*]

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1(*a*)

(i) 35 – 39 — P1

(ii) K2

$$\frac{17(3)+22(7)+27(15)+32(20)+37(21)+42(10)+47(4)}{80}$$

32.94 — N1 **4**

(*b*)

Upper Boundary *Sempadan Atas*	**Cumulative Frequency** *Kekerapan Longgokan*	
14.5	**0**	I
19.5	3	II
24.5	10	III
29.5	25	IV
34.5	45	V
39.5	66	VI
44.5	76	VII
49.5	80	VIII

P1

Upper boundary : (III to VIII)

Cumulative Frequency : (II to VIII) — P2 **3**

(*c*)

Note: Allow one mistake in cumulative frequency for P1. — P1

Axes drawn in correct direction, uniform scale for $14.5 \le x \le 49.5$ and $0 \le y \le 80$ — K2

* 8 points correctly plotted

Note: 6 or 7 points correctly plotted, award K1 — N1 **4**

(*d*)

Smooth and continuous curve without any straight line passes all 8 points for $14.5 \le x \le 49.5$. — P1 **1**

33 — **12**

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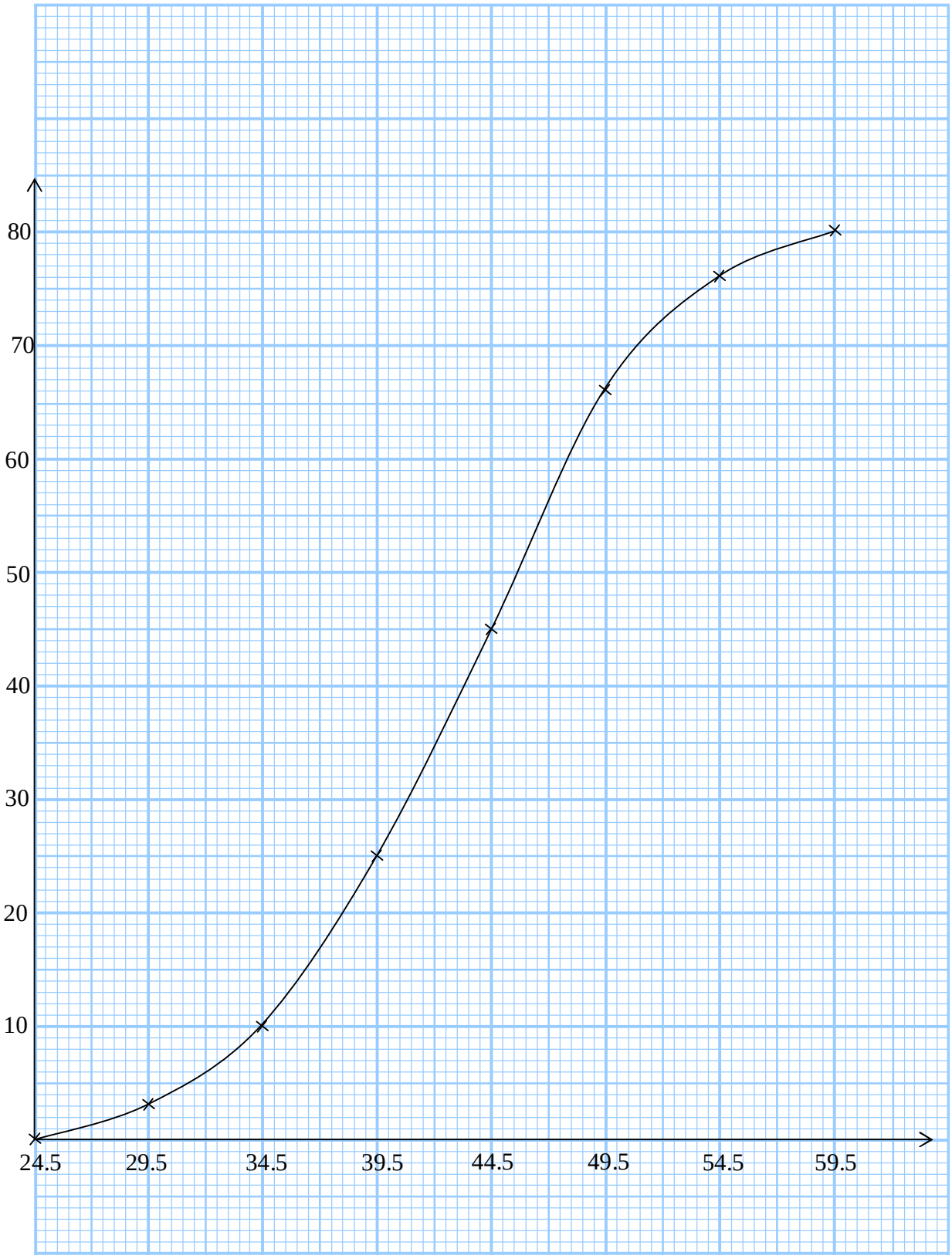
Graph for Question 16
Graf untuk Soalan 16



END OF MARK SCHEME

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2(*a*)

I	21 - 25	2	2
II	26 - 30	5	7
III	31 - 35	8	15
IV	36 - 40	12	27
V	41 - 45	9	36
VI	46 - 50	4	40
VII	51 - 55	2	42

Class interval : (III hingga VII) betul

Frequency : (I hingga VII) betul 1M

Cumulative Frequency : (I hingga VII) betul 2M

Nota: Benarkan dua kesilapan dalam frequency untuk 1M 1M **4**

(*b*) *Ogif*

Paksi-paksi dilukis dengan arah yang betul, skala seragam bagi

$25.5 \leq x \leq 55.5$ dan $0 \leq y \leq 40$. 1M

Paksi-*x* dilabel menggunakan sempadan atas *atau* nilai sempadan atas digunakan untuk plot. 1M

Plot 7 titik* yang betul.

5 atau 6 titik* betul dapat 1M. 2M

(20.5, 0) ditanda pada graf. 1M

(*c*) Lengkung licin dan berterusan tanpa bahagian garis lurus dan melalui semua 8 titik yang betul.bagi $20.5 \leq x \leq 55.5$. 1M

33 ± 0.5 1M **6**

25% murid mendapat *33 markah atau kurang 1M

12

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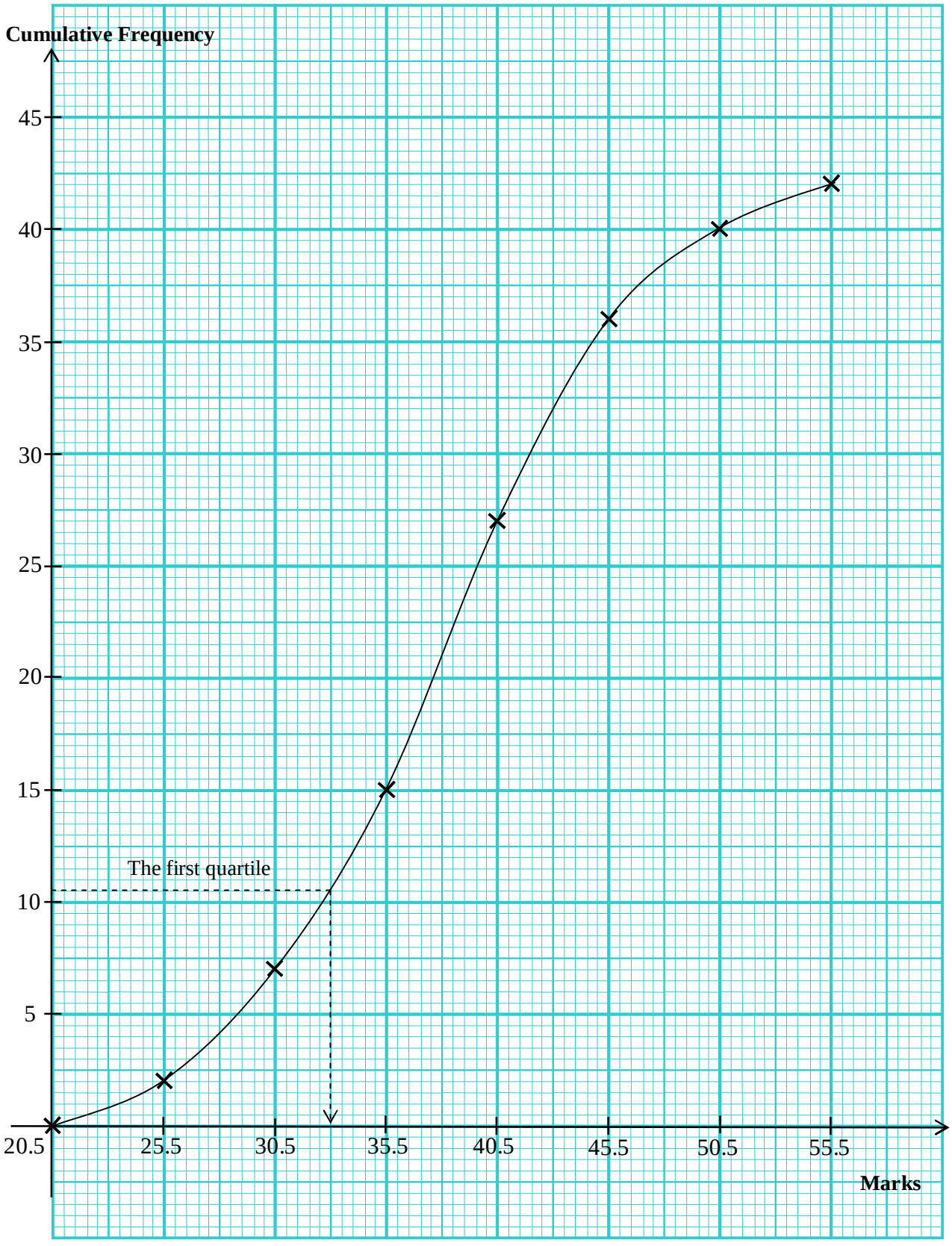

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3(*a*)

	Class Interval *Selang Kelas*	Frequency *Kekerapan*	Midpoint *Titik Tengah*
I	31 - 40	**2**	35.5
II	41 - 50	**3**	**45.5**
III	**51 - 60**	**7**	**55.5**
IV	**61 - 70**	**5**	**65.5**
V	**71 - 80**	**10**	**75.5**
VI	**81 - 90**	**4**	**85.5**
VII	91 - 100	**1**	95.5

Class interval : (III to VI)	P1	
Frequency : (I to VII)	P2	
Midpoint : (II to VI) Note: Allow one mistake frequency for P1.	P1	**4**
$\frac{35.5(2)+45.5(3)+55.5(7)+65.5(5)+75.5(10)+85.5(4)+95.5(1)}{32}$	K2	
59.67	N1	
Axes drawn in correct directions with uniform scale for $30.5 \le x \le 105.5$ and $0 \le y \le 10$	P1	
* 7 bar drawn correctly using the midpoint/upper boundary/class interval. Note: * 5 or * 6 bar drawn correctly, award K1	K2	
Correct histogram using the given scales for $30.5 \le x \le 105.5$ and $0 \le y \le 10$.	N1	
Modal class is 71 - 80	K1	**12**

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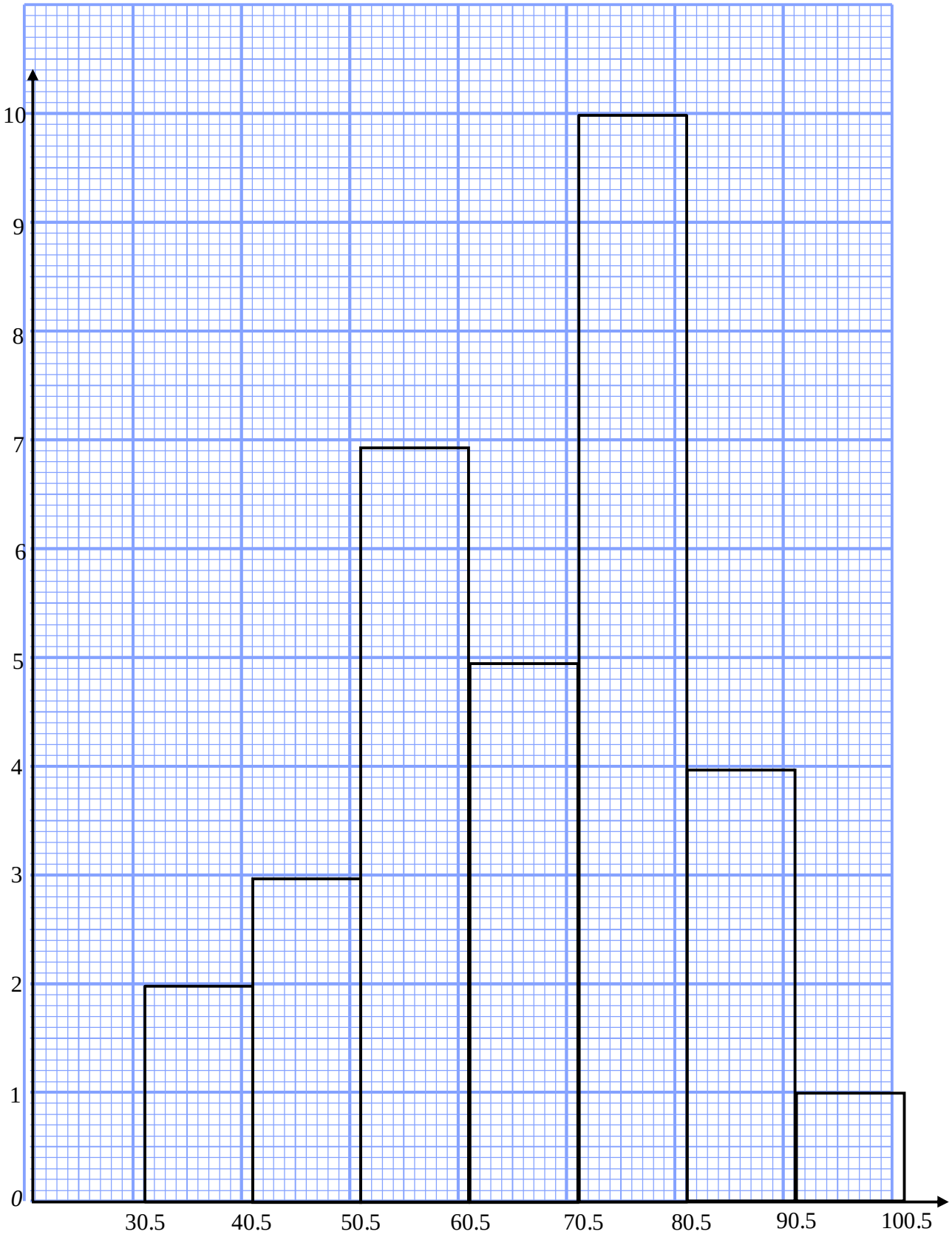

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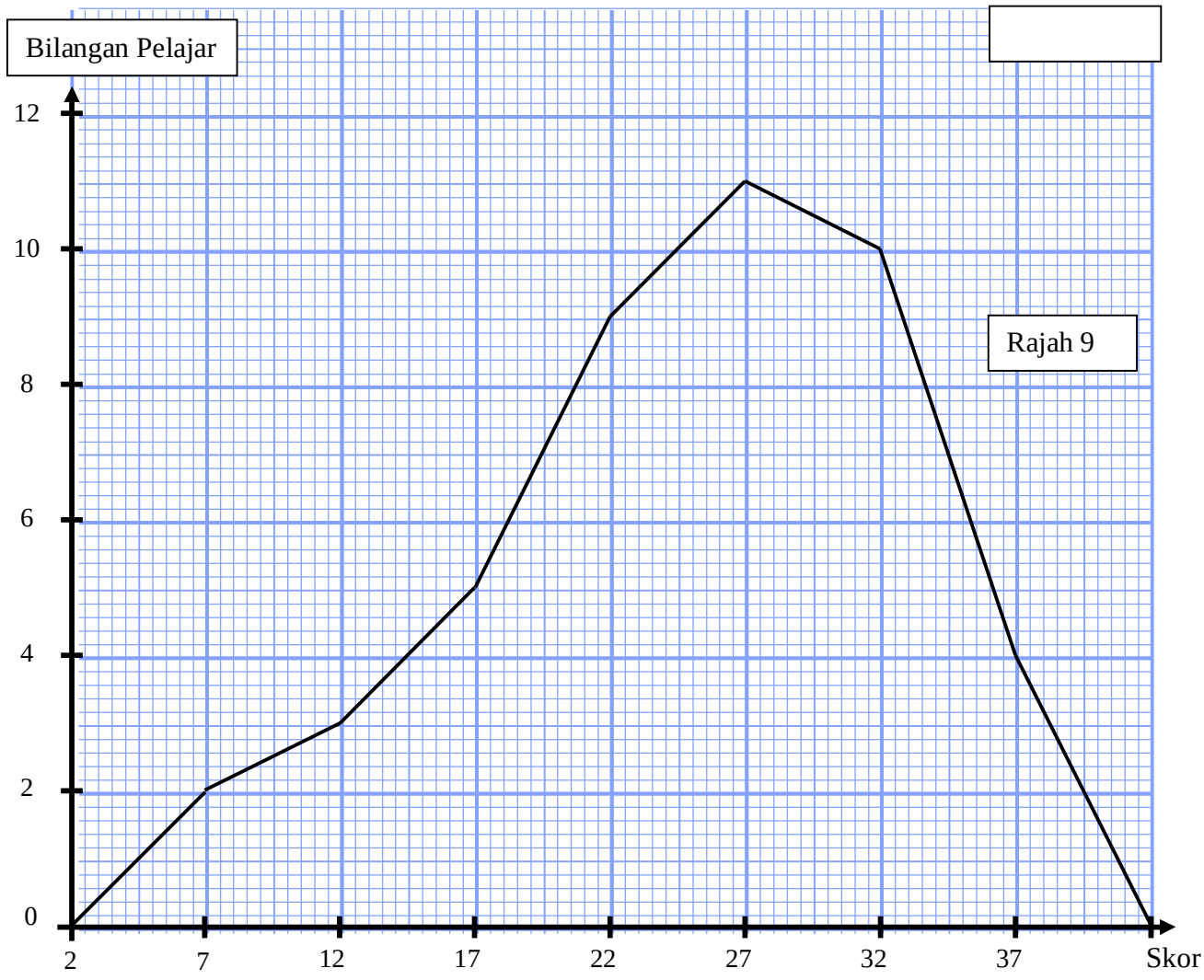
4. Rajah 9 ialah poligon kekerapan yang mewakili skor bagi 44 orang pelajar dalam suatu ujian objektif Matematik SPM.
   (a) Berdasarkan maklumat poligon kekerapan itu, lengkapkan jadual berikut.

Skor	Sempadan Atas	Titik Tengah	Kekerapan	Kekerapan Longgokan
5 - 9	9.5	7	2	
10 - 14				



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4 (a)

	Skor	Sempadan Atas	Titik Tengah	Kekerapan	Kekerapan Longgokan
I					
II	**5 – 9**	**9.5**	**7**	**2**	2
III	**10 – 14**	14.5	12	3	5
IV	15 – 19	19.5	17	5	10
V	20 – 24	24.5	22	9	19
VI	25 – 29	29.5	27	11	30
VII	30 – 34	34.5	32	10	40
VIII	35 – 39	39.5	37	4	44

Selang kelas : (III hingga VIII) betul
Sempadan Atas : (II hingga VIII) betul 1M
Titik tengah : (II hingga VIII) betul 1M
Kekerapan : (II hingga VIII) betul 1M
Kekerapan longgokan : (I hingga VIII) betul 1M
1M 5

(b) Ogif

Paksi-paksi dilukis dengan arah yang betul, skala seragam bagi $4.5 \leq x \leq 39.5$ dan $0 \leq y \leq 44$, dan paksi-x dilabel menggunakan sempadan atas. 1M

Plot 7 titik* yang betul.
5 atau 6 titik* betul dapat 1M. 2M

(4.5, 0) ditanda pada graf. 1M

Lengkung licin dan berterusan tanpa bahagian garis lurus dan melalui semua 8 titik yang betul.bagi $4.5 \leq x \leq 39.5$. 1M 5

(c) Sebarang maklumat yang betul daripada ogif*.

Contoh : 2M 2
50% pelajar mendapat skor kurang daripada 26* dalam ujian itu atau
22 orang pelajar mendapat skor kurang daripada 26* dalam ujian itu atau
25% / 11 orang pelajar mendapat skor kurang daripada 20* dalam ujian itu atau
75% / 33 orang pelajar mendapat skor kurang daripada 31* dalam ujian itu atau
25% / 11 orang pelajar mendapat sekurang-kurangnya skor 31* dalam ujian itu atau setara.

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