



ST. JOHN'S INSTITUTION
KUALA LUMPUR
KEMENTERIAN PENDIDIKAN MALAYSIA

PEPERIKSAAN PERCUBAAN SPM 2017

1449/2

MATHEMATICS

Kertas 2

Ogos

2 $\frac{1}{2}$ jam

Dua jam tiga puluh minit

JANGAN BUKA KERTAS PEPERIKSAAN SEHINGGA DIBERITAHU

1. Tulis nama dan kelas anda pada petak yang disediakan.
2. Kertas peperiksaan ini adalah dalam Bahasa Inggeris.
3. Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.
4. Calon dikehendaki membaca maklumat di halaman belakang kertas peperiksaan ini.

Disediakan oleh :

(MOHD SYAMIM)
Guru Akademik
St. John's Institution

Disahkan oleh :

(SITI NAIWA)
Guru Kanan Sains &
Matematik, SJI

Disemak oleh :

(LEE CHEE SENG)
Ketua Panitia Matematik
St. John's Institution

Disahkan oleh :

NUR HANIM BINTI KHALIL
(MANMOHAN SINGH)
Penolong Kanan Tadbir & Kurikulum
b.p. Pengetua
St. John's Institution
Jalan Bukit Nanas
52050 Kuala Lumpur

Untuk Kegunaan Pemeriksa			
Kod Pemeriksa :			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	3	
	2	4	
	3	4	
	4	4	
	5	4	
	6	5	
	7	5	
	8	6	
	9	6	
	10	5	
	11	6	
B	12	12	
	13	12	
	14	12	
	15	12	
	16	12	
Jumlah			

Kertas peperiksaan ini mengandungi 26 halaman bercetak dan 0 halaman tidak bercetak.

Section A

[52 marks]

For
Examiner's
Use

Answer all questions in this section.

- 1 The Venn diagram in the answer space shows sets P , Q and R such that the universal set $\xi = P \cup Q \cup R$.

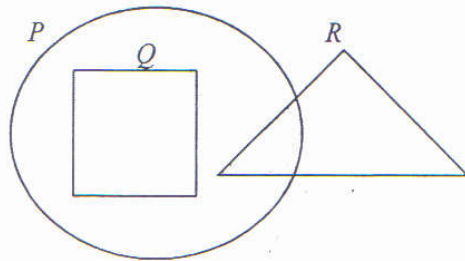
On the diagram in the answer space, shade the set

- a) $P \cap R$
b) $Q \cup (P' \cap R)$

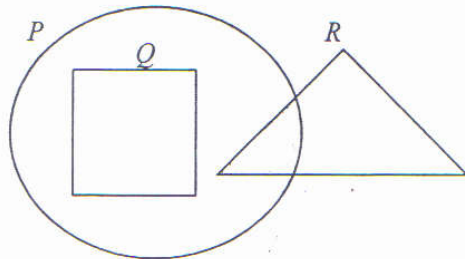
[3 marks]

Answer :

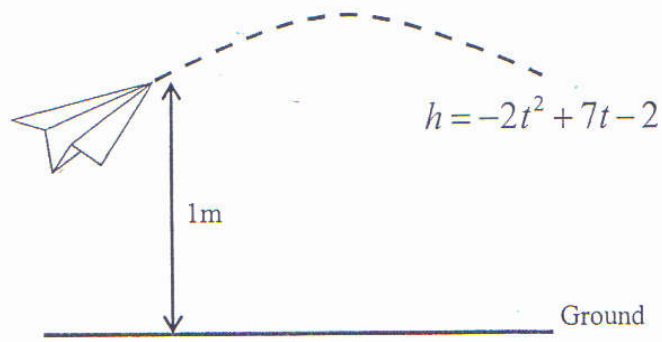
a)



b)



2



A paper plane is thrown at the height of 1m from the ground.

The paper plane creates a curve path, $h = -2t^2 + 7t - 2$.

When will the paper plane be caught 1m from the ground?

[4 marks]

Answer :

- 3 Diagram 3 shows the base of a swimming pool.

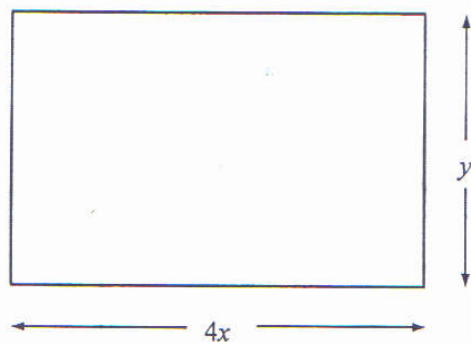


Diagram 3

The different between the length and its width is 10m.

The perimeter of the base is 36m.

What is the length and the width of the swimming pool?

[4 marks]

Answer :

For
Examiner's
Use

- 4 Diagram 4 shows a right prism with a uniform cross section in the shape of right-angled triangle RST . M is a midpoint of ST .

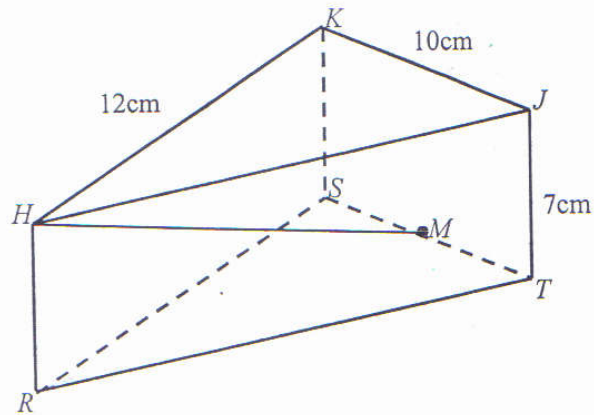


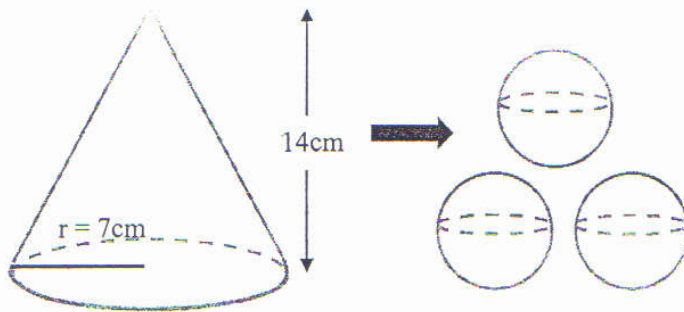
Diagram 4

- Name the angle between line HM and the plane RST .
- Hence, calculate the angle between the line HM and the plane RST .

[4 marks]

Answer :

- 5 A gold cone is melted to produce 3 identical gold spheres.
Given that the radius of the gold cone is 7cm and its height is 14cm.



Find the radius, in cm for each of the sphere.

[4 marks]

Answer :

For
Examiner's
Use

6. Diagram 6 shows two parallel lines, OP and QR .
Straight line PR is parallel to x -axis and O is origin.

Given the gradient of OP is $\frac{3}{4}$.

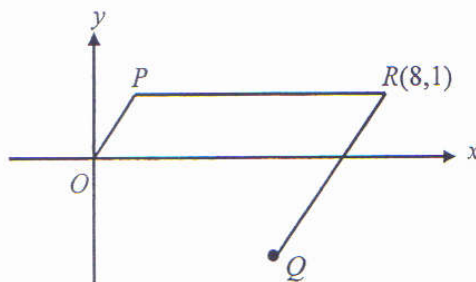


Diagram 6

- (a) Find the equation of straight line PR .
(b) Find the equation of straight line QR .
(c) Find the y -intercept of straight line QR .

[5 marks]

Answer :

(a)

(b)

*For
Examiner's
Use*

- 7 a) State whether the following statement is true or false.
Some multiples of 3 is divisible by 2

- b) Write down the converse of the following implication.
Hence, state whether the converse is true or false.

$$\text{If } x^3 = 125, \text{ then } x = 5$$

- c) Area of a trapezium with the sum of its parallel line is 24cm and its height, h is $\frac{1}{2}(24)(h)$.

Make one conclusion by deduction for the area of trapezium with the same sum of parallel lines and the height is 7cm.

[5 marks]

Answer :

a)

b)

c)

For
Examiners
Use

8

It is given matrix $A = \begin{pmatrix} 5 & -3 \\ -2 & 4 \end{pmatrix}$.

- a) Find the inverse matrix of A .
- b) Write the following simultaneous linear equation as matrix equation:

$$5x - 3y = 11$$

$$-2x + 4y = -10$$

Hence, by using matrix method, calculate the value of x and of y .

[6 marks]

Answer :

a)

b)

- 9 Tony Stark wanted to build an arc reactor. The plan of the arc reactor is as shown in Diagram 9.

It is noted that an equilateral triangle can exactly fit into the circle. The length of the triangle is 12.12cm and the diameter of the circle is 14cm.

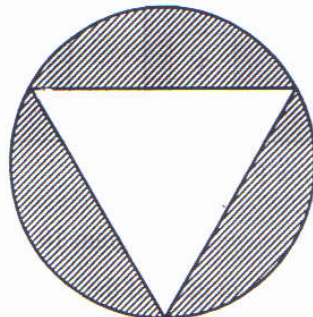


Diagram 9

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

- the perimeter, in cm, of the shaded region.
- the area, in cm^2 , of the shaded region.

[6 marks]

Answer :

a)

b)

10 Diagram 10 shows nine labelled cards in two boxes.

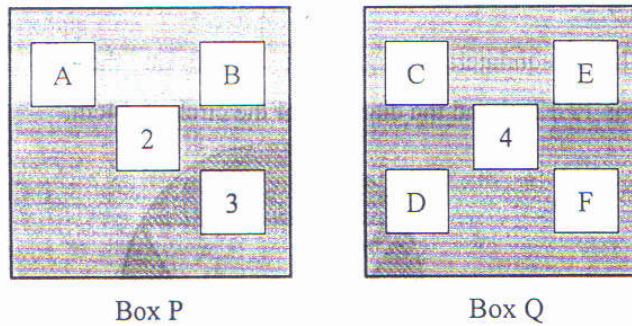


Diagram 10

A card is picked at random from each of the boxes.

By listing the outcomes, find the probability that

- both cards are labelled with a number,
- one card is labelled with a number and the other card is labelled with a letter.

[5 mark]

Answer :

a)

b)

- 11 Diagram 11 shows a speed-time graph for the movement of a photon for a period of 40 seconds.

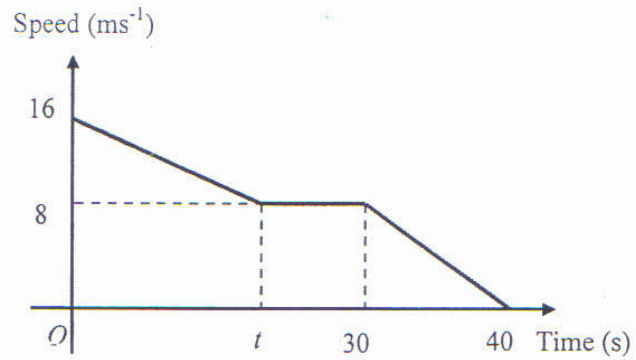


Diagram 11

The total distance travelled by the photon is 380m.

- Find the average speed in ms^{-1} of the photon for the period of 40 seconds.
- Calculate the rate of change of speed, in ms^{-2} , of the photon in the last 10 seconds.
- Calculate the value of t .

[6 marks]

Answer :

a)

b)

c)

Answer any **four** questions from this section.

12

- a) Complete Table 12 in the answer space on page 16 for the equation $y = -\frac{10}{x}$ by writing down the values of y when $x = -2.5$ and $x = 1.6$.

[2 marks]

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

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 $y = -\frac{10}{x}$ for $-4 \leq x \leq 4$.

[4 marks]

- c) From the graph in 12(b), find

- i) the value of y when $x = -2.9$
- ii) the value of x when $y = -7.8$

[2 marks]

- d) Draw a suitable straight line on the graph in 12(b) to find the values of x which satisfy the equation $-\frac{10}{x} + 2x - 4 = 0$ for $-4 \leq x \leq 4$.

[4 marks]

Answer :

a) $y = -\frac{10}{x}$

x	-4	-2.5	-2	-1	1	1.6	2	4
y	2.5		5	10	-10		-5	-2.5

- b) Refer graph

c) i) $y = \dots\dots\dots$

ii) $x = \dots\dots\dots$

- d)

$x = \dots\dots\dots, x = \dots\dots\dots$

- 13 (a) Diagram 13(i) shows the point (2,4) and the straight line $y = x$ drawn on a Cartesian plane.

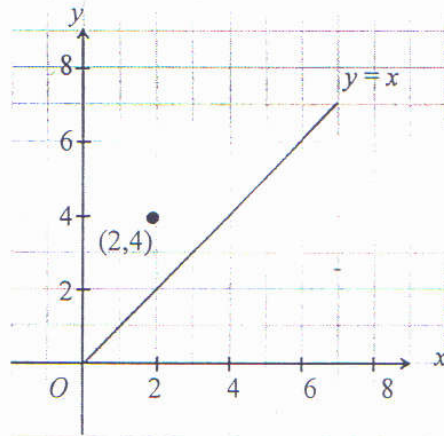


Diagram 13(i)

Transformation T is a translation $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$. Transformation U is a reflection in

the line $y = x$. state the coordinates of the image of point (2,4) under each of the following transformations:

- (i) T^2
 (ii) TU

[3 marks]

- (b) Diagram 13(ii) shows pentagons $ABCDE$, $QKRSU$ and $JKLMN$ drawn on a Cartesian plane.

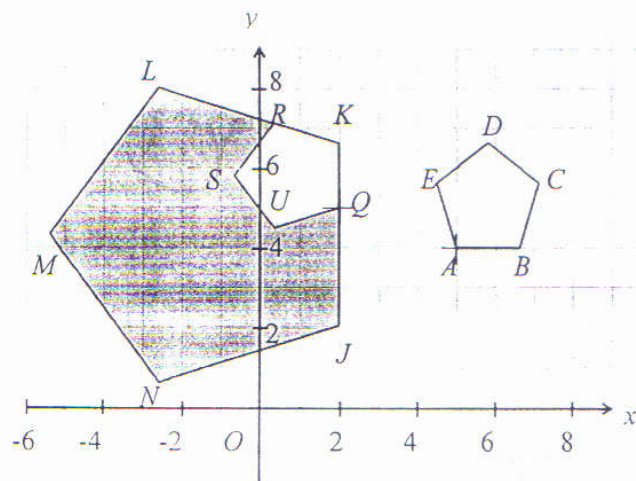


Diagram 13(ii)

*For
Examiner's
Use*

- (i) JKLMN is the image of ABCDE under the combined transformation WV.
Describe in full, the transformation:
- a) V
 - b) W
- (ii) Given the pentagon ABCDE represents a region of 60cm^2 . Calculate the area, in cm^2 , of the shaded region.

[9 marks]

Answer :

a) i)

ii)

b) i) a)

b)

ii)

- 14 Diagram 14 shows an ogive which represent the time taken by 100 students from their house to St. John's Institution.

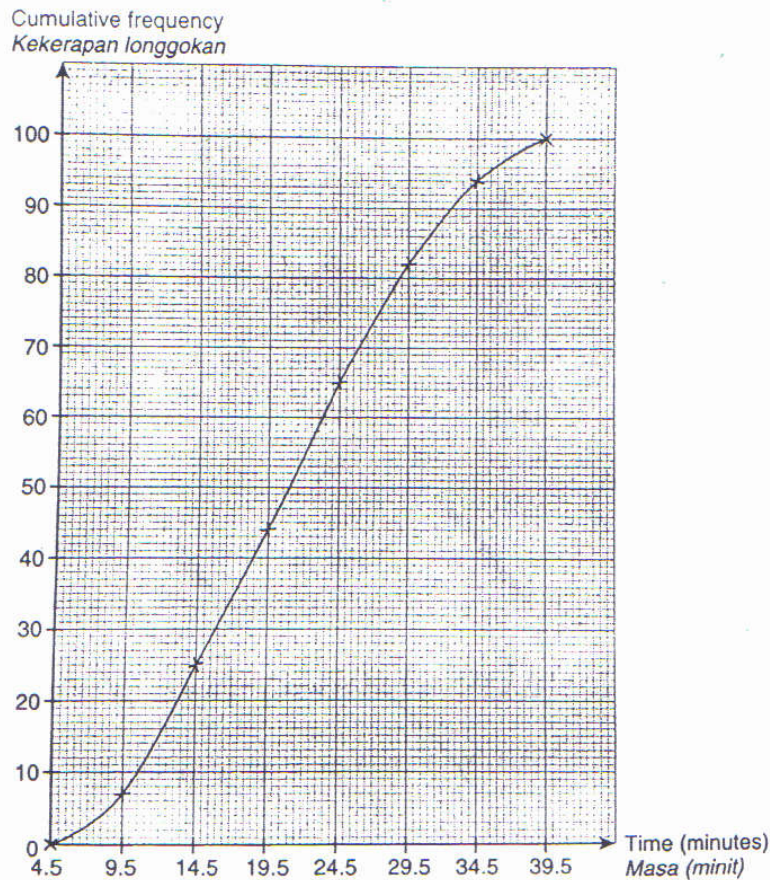


Diagram 14

- a) Based on diagram 14, complete the Table 14 in the answer space on page 20.
[4 marks]
- b) Calculate the estimated mean.
[3 marks]
- c) For this part of the question, use the graph paper provided.
By using a scale of 2 cm to 5 minutes on the horizontal axis and 2 cm to 2 students on the vertical axis, draw a frequency polygon for the data.
[4 marks]
- d) Based on the frequency polygon drawn in 14(c), state one information.
[1 marks]

For
Examiner's
Use

Answer :

a)

Time (minutes)	Upper boundary	Cumulative frequency	Frequency	Midpoint
0 - 4	4.5	0	0	2
5 - 9	9.5	7	7	7

Table 14

b)

c) Refer graph

d)

- 15 You are not allowed to use graph paper to answer this question.
- a) Diagram 15 shows a solid right prism with a rectangular base $ABCD$ on a horizontal plane. The surface $ABJFE$ is the uniform cross section of the prism. AE, DH, FJ and GK are vertical edges. It is given that KG is 2cm and HG is 6cm. Rectangle $EFGH$ is a horizontal plane and rectangle $BCKJ$ is an inclined plane.

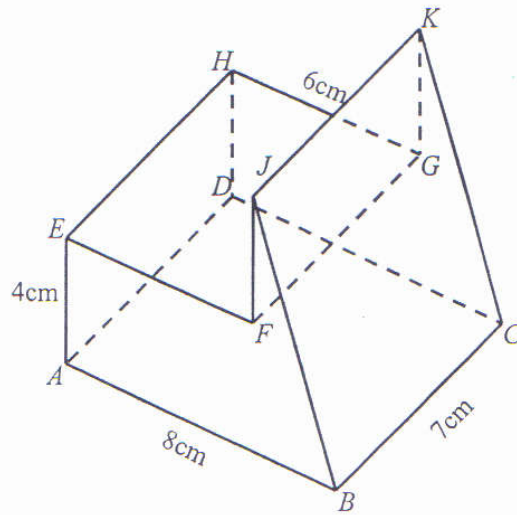


Diagram 15(i)

Draw a full scale, the plan of the solid.

[3 marks]

Answer :

a)

For
Examiner's
Use

- b) A part of the prism is removed and a cone with the height of 5cm and diameter of 5cm is joined to the prism in diagram 15(i). The combined solid is shown in Diagram 15(ii).

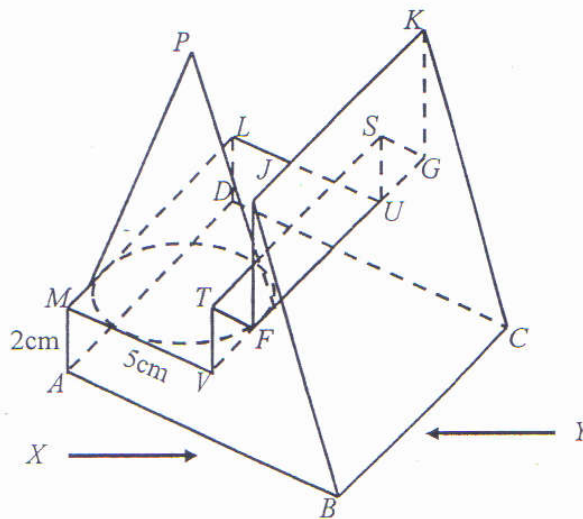


Diagram 15(ii)

Draw full scale,

- (i) the combination of combined solid on a vertical plane parallel to AB as viewed from X .

[4 marks]

- (ii) the elevation of the combined solid on a vertical plane parallel to BC as viewed from Y .

[5 marks]

Answer :

*For
Examiner's
Use*

b) i)

ii)

Answer :

a)

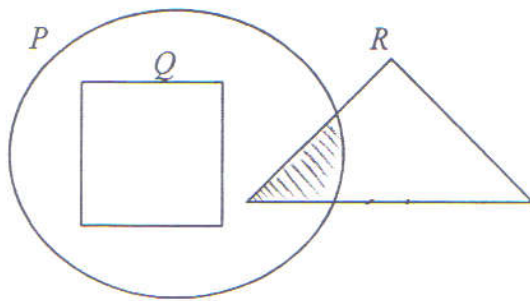
b)

c)

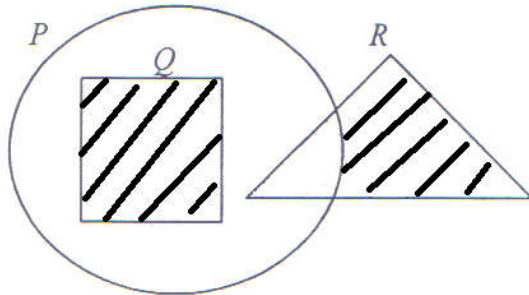
d)

END OF QUESTION PAPER

1. a)



b)



2.

$$h = -2t^2 + 7t - 2$$

$$l = -2t^2 + 7t - 2$$

$$-2t^2 + 7t - 2 - 1 = 0$$

$$-2t^2 + 7t - 3 = 0$$

$$(t-3)(2t-1) = 0$$

$$t = 3, t = \frac{1}{2}$$

3.

$$4x - y = 10$$

$$8x + 2y = 36$$

$$y = 4x - 10$$

$$8x + 2(4x - 10) = 36$$

$$8x + 8x - 20 = 36$$

$$16x = 36 + 20$$

$$16x = 56$$

$$x = \frac{56}{16}$$

$$x = \frac{7}{2}$$

$$4\left(\frac{7}{2}\right)$$

$$\text{length} = 14 \text{ cm}$$

$$\text{width} = 4 \text{ cm}$$

$$4\left(\frac{7}{2}\right) - y = 10$$

$$14 - 10 = y$$

$$y = 4$$

4.

* HMR.

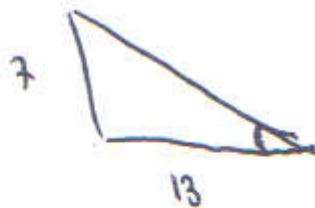
$$\sqrt{12^2 + 5^2}$$

$$= 13 \text{ cm}$$

$$\tan \theta = \frac{7}{13}$$

$$\theta = \tan^{-1} \frac{7}{13}$$

$$\theta = 28.30^\circ$$



SOH
CAH
TOA

5.

$$\frac{1}{3} \times \frac{22}{7} \times 7^2 \times 14$$

$$= 718.67 \text{ cm}^3$$

$$718.67 \div 3$$

$$= 239.56 \text{ cm}^3$$

$$\frac{4}{3} \times \frac{22}{7} \times r^3 = 239.56 \text{ cm}^3$$

$$4.19 \times r^3 = 239.56 \text{ cm}^3$$

$$r^3 = \frac{239.56}{4.19}$$

$$r^3 = 57.17$$

$$r = \sqrt[3]{57.17}$$

$$r = 3.88 \text{ cm}$$

6.

(a) $y = 1$

(b) $y = mx + c$

$$y = \frac{3}{4}x - 5$$

$$1 = \frac{3}{4}(2) + c$$

$$1 = 6 + c$$

$$1 - 6 = c$$

$$c = -5$$

$$y\text{-intercept} = 0$$

$$y = \frac{3}{4}(0) - 5$$

$$y = -5$$

7.

a) True

c)

$$\frac{1}{2} (2u)(7)$$

b) If $x = 5$, then $x^3 = 125$

$$84 \text{ cm}^2$$

the converse is true

The area of the trapezium is 84 cm^2

8.

a)

$$\begin{pmatrix} 5 & -3 \\ -2 & 4 \end{pmatrix}$$

$$\frac{1}{20-6} \begin{pmatrix} 4 & 3 \\ 2 & 5 \end{pmatrix}$$

$$\frac{1}{14} \begin{pmatrix} 4 & 3 \\ 2 & 5 \end{pmatrix}$$

b)

$$\begin{pmatrix} 5 & -3 \\ -2 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 11 \\ -10 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{20-6} \begin{pmatrix} 4 & 3 \\ 2 & 5 \end{pmatrix} \begin{pmatrix} 11 \\ -10 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{14} \begin{pmatrix} 4 & 3 \\ 2 & 5 \end{pmatrix} \begin{pmatrix} 11 \\ -10 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$$

$$x = 1 \quad y = -2$$

9.

a)

$$\frac{22}{7} \times 14$$

$$= 154 \text{ cm}$$

$$154 \text{ cm} + 12 \cdot 12 \text{ cm} + 12 \cdot 12 \text{ cm} + 12 \cdot 12 \text{ cm} + 12 \cdot 12 \text{ cm}$$

$$= 80.36 \text{ cm}$$

b) Area of triangle

$$\sqrt{12 \cdot 12^2 - 6 \cdot 6^2}$$

$$= 10.80 \text{ cm}$$

$$\frac{1}{2} \times 12 \cdot 12 \times 10.80$$

$$= 63.63 \text{ cm}^2$$

Area of circle

$$\frac{22}{7} \times 7^2$$

$$= 154 \text{ cm}^2$$

Area of shaded region

$$154 \text{ cm}^2 - 63.63 \text{ cm}^2$$

$$= 90.37 \text{ cm}^2$$

10.

$$a) P = \{ (A, C), (A, E), (A, U), (A, D), (A, F) \\ (B, C), (B, E), (B, U), (B, D), (B, F) \\ (2, C), (2, E), (2, U), (2, D), (2, F) \\ (3, C), (3, E), (3, U), (3, D), (3, F) \}$$

$$n(P) = 20$$

$$P = \{ (2, U), (3, U) \}$$

$$b) P = \frac{2}{20} = \frac{1}{10} \neq$$

$$P = \{ (A, U), (B, U), (2, C), (2, E), (2, D), (2, F), (3, C), (3, E), (3, D), (3, F) \}$$

$$P = \frac{10}{20} = \frac{1}{2}$$

11.

a) 9.5 ms^{-1}

b) $\frac{0 - 8}{10} = -0.8 \text{ ms}^{-2}$

c) $\frac{1}{2} \times (16 + 8)t + (30 - t)8 + \frac{1}{2} \times 8 \times 10 = 380$

$$12t + 240 - 8t + 40 = 380$$

$$4t = 380 - 280$$

$$4t = 100$$

$$t = 25\text{s}$$

12. (a) 4, -6.25

(c) i) 3.5

ii) 1.25

13.

a) i) $(2, 4) \xrightarrow{T} (5, 3) \xrightarrow{T} (8, 2)$

ii) $(2, 4) \xrightarrow{U} (4, 2) \xrightarrow{T} (7, 1)$

b) i) a) $V \rightarrow$ Rotation 90° anticlockwise at centre (3,3)b) $W \rightarrow$ Enlargement, $K = 3$, at centre Kii) $K^2 = \frac{\text{Area Image}}{\text{Area object}}$, If x is the area of the shaded region

$$3^2 = \frac{60 + x}{60}$$

$$540 - 60 = x$$

$$x = 480\text{cm}^2$$

14. a)

Time (minutes)	Upper boundary	Cumulative frequency	Frequency	Midpoint
0 - 4	4.5	0	0	2
5 - 9	9.5	7	7	7
10 - 14	14.5	25	18	12
15 - 19	19.5	44	19	17
20 - 24	24.5	65	21	22
25 - 29	29.5	82	17	27
30 - 34	34.5	94	12	32
35 - 39	39.5	100	6	37

Table 14

b)

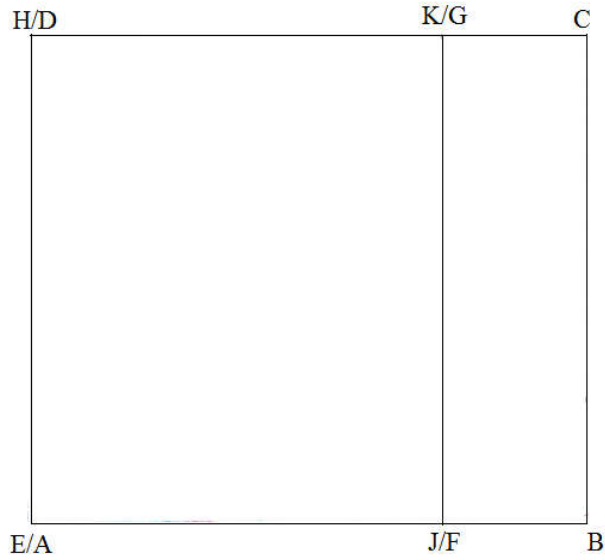
$$\frac{(0 \times 2) + (7 \times 7) + (12 \times 18) + (19 \times 17) + (21 \times 22) + (17 \times 27) + (12 \times 32) + (6 \times 37)}{0 + 7 + 18 + 19 + 21 + 17 + 12 + 6}$$

$$0 + 7 + 18 + 19 + 21 + 17 + 12 + 6$$

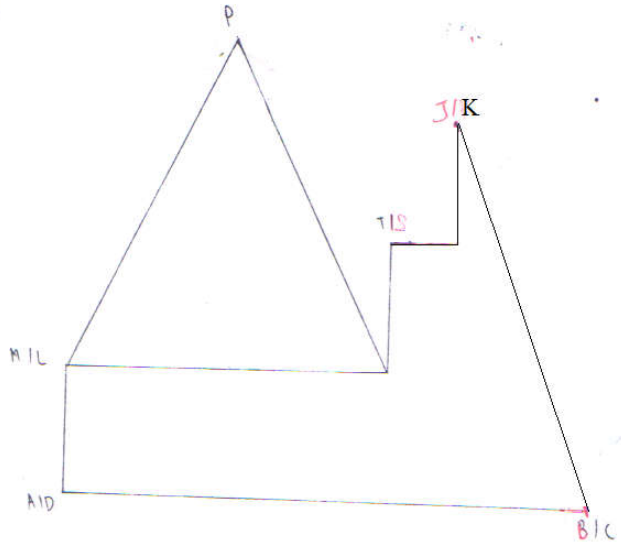
$$\frac{2115}{100}$$

Mean = 21.15

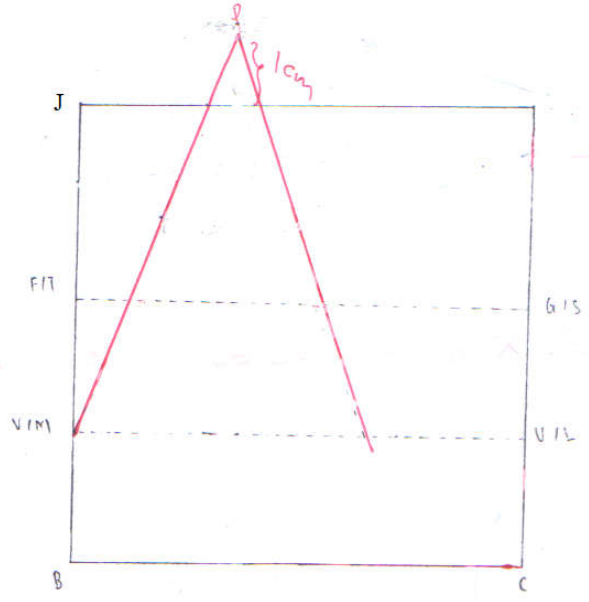
15. a)



b) i)



ii)



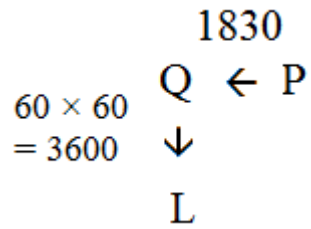
16. a) (60 °N, 135 °E)

b) $\frac{3660}{60} = 61$

$135 - 61 = 74^\circ \text{ E}$

c) $61 \times 60 \times \cos 60 = 1830 \text{ n.m}$

d)



$S = 550 \text{ knots}, T = \frac{3600 + 1830}{550} = 9.87 \text{ hours}$