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0580/43

May/June 2018

2 hours 30 minutes

Additional Materials: Electronic calculator Geometrical instruments
Tracing paper (optional).

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

For π , use either your calculator value or 3.142.

The total of the marks for this paper is 130.

This document consists of **19** printed pages and **1** blank page.

1 (a) Rowena buys and sells clothes.

(i) She buys a jacket for \$40 and sells it for \$45.40 .

Calculate the percentage profit.

..... % [3]

(ii) She sells a dress for \$42.60 after making a profit of 20% on the cost price.

Calculate the cost price.

\$ [3]

(b) Sara invests \$500 for 15 years at a rate of 2% per year simple interest.

Calculate the total interest Sara receives.

\$ [2]

(c) Tomas has two cars.

- (i) The value, today, of one car is \$21 000.
The value of this car **decreases** exponentially by 18% each year.

Calculate the value of this car after 5 years.
Give your answer correct to the nearest hundred dollars.

\$ [3]

- (ii) The value, today, of the other car is \$15 000.
The value of this car **increases** exponentially by $x\%$ each year.
After 12 years the value of the car will be \$42 190.

Calculate the value of x .

$x =$ [3]

2 (a) (i) $y = 2^x$

Complete the table.

x	0	1	2	3	4
y		2	4	8	

[2]

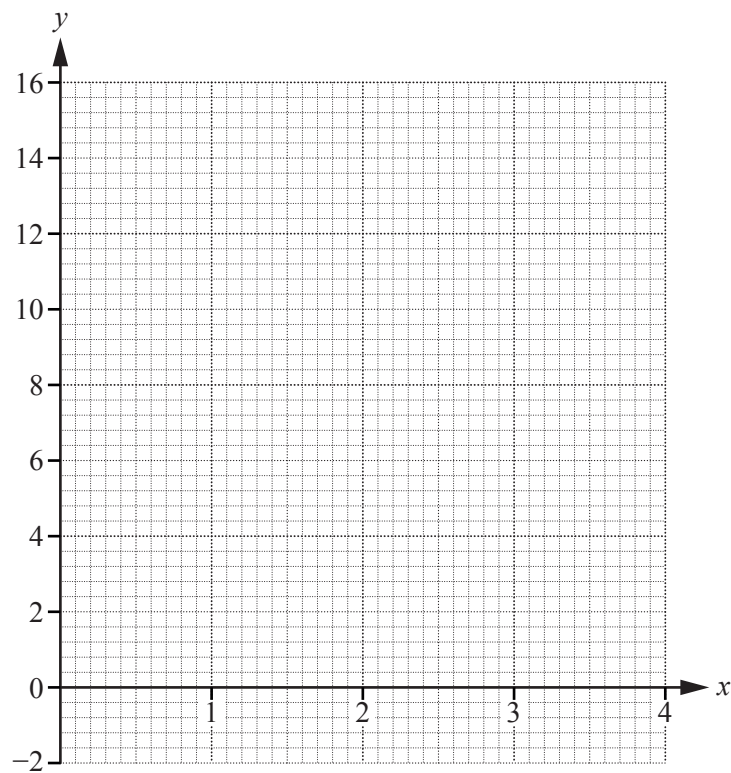
(ii) $y = 14 - x^2$

Complete the table.

x	0	1	2	3	4
y		13	10	5	

[2]

(b) On the grid, draw the graphs of $y = 2^x$ and $y = 14 - x^2$ for $0 \leq x \leq 4$.



[6]

(c) Use your graphs to solve the equations.

(i) $2^x = 12$

$x = \dots\dots\dots$ [1]

(ii) $2^x = 14 - x^2$

$x = \dots\dots\dots$ [1]

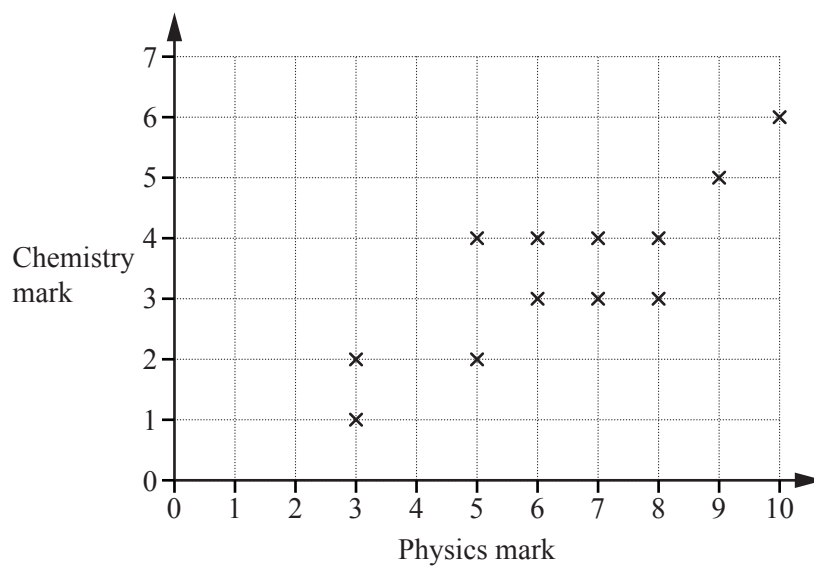
(d) (i) On the grid, draw the line from the point (4, 2) that has a gradient of -4 . [1]

(ii) Complete the statement.

This straight line is a $\dots\dots\dots$ to the graph of $y = 14 - x^2$

at the point ($\dots\dots\dots$, $\dots\dots\dots$). [2]

- 3 (a) The scatter diagram shows the physics mark and the chemistry mark for each of 12 students.



- (i) What type of correlation is shown in the scatter diagram?

..... [1]

- (ii) On the scatter diagram, draw a line of best fit.

[1]

- (iii) Find an estimate of the chemistry mark for another student who has a physics mark of 4.

..... [1]

- (b) A teacher records the number of days each of the 24 students in her class are absent. The frequency table shows the results.

Number of days	0	1	2	3	4	5
Frequency	10	8	3	2	0	1

Find the mode, the median and the mean.

Mode =

Median =

Mean = [5]

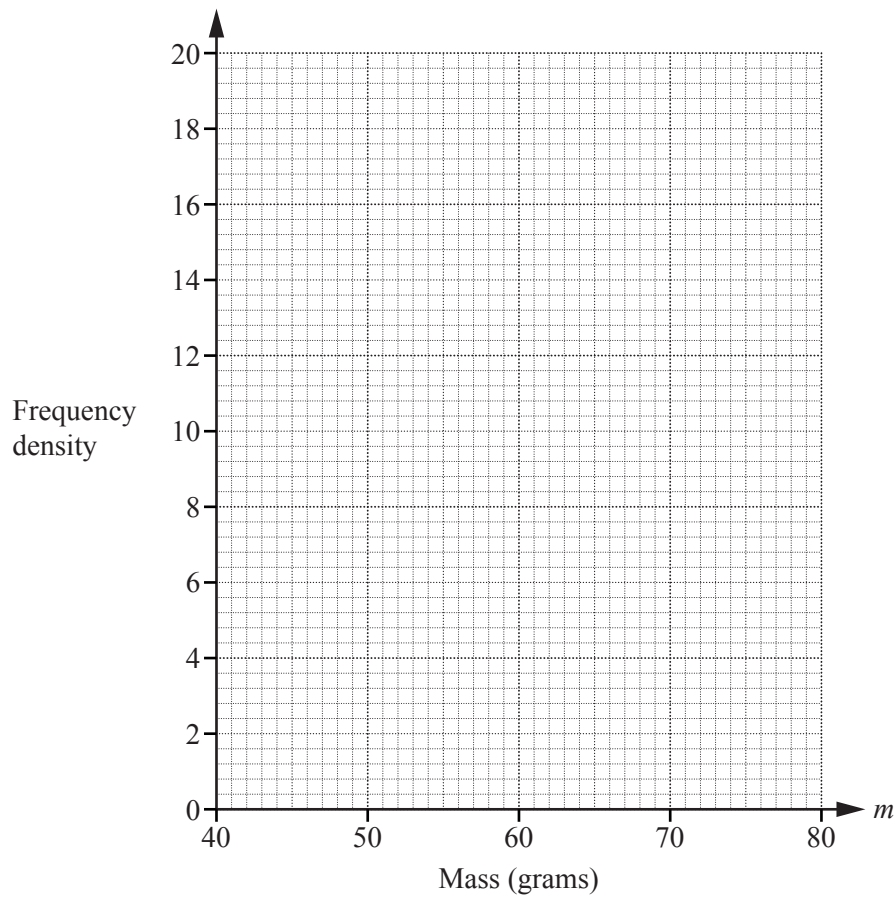
- (c) Three sizes of eggs are sold in a shop.
The table shows the number of eggs of each size sold in one day.

Size	Small	Medium	Large
Mass (m grams)	$46 < m \leq 52$	$52 < m \leq 62$	$62 < m \leq 80$
Number of eggs sold	78	180	162

- (i) Calculate an estimate of the mean mass.

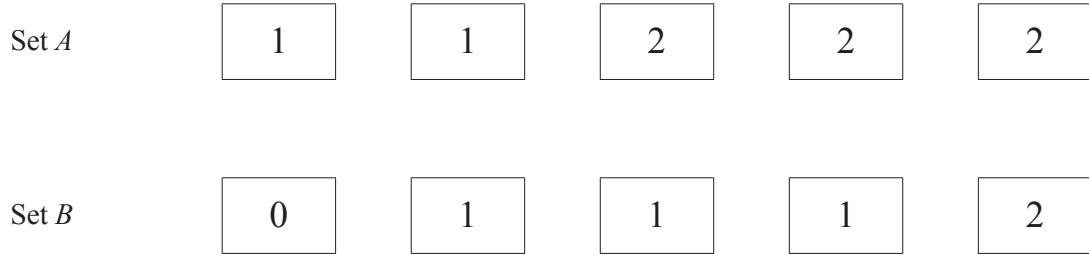
..... g [4]

- (ii) On the grid, draw a histogram to show the information in the table.



[4]

- 4 (a) The diagram shows two sets of cards.



- (i) Jojo chooses two cards at random from Set *A* without replacement.

Find the probability that the two cards have the same number.

..... [3]

- (ii) Jojo replaces the two cards.
Kylie then chooses one card at random from Set *A* and one card at random from Set *B*.

Find the probability that the two cards have the same number.

..... [3]

- (iii) Who is the most likely to choose two cards that have the same number?
Show all your working.

..... [1]

(b)

Set C

4

4

5

5

5

Lena chooses three cards at random from Set C without replacement.

Find the probability that the third card chosen is numbered 4.

..... [3]

- 5 (a) At a football match, the price of an adult ticket is $\$x$ and the price of a child ticket is $\$(x - 2.50)$. There are 18 500 adults and 2400 children attending the football match. The total amount paid for the tickets is $\$320\,040$.

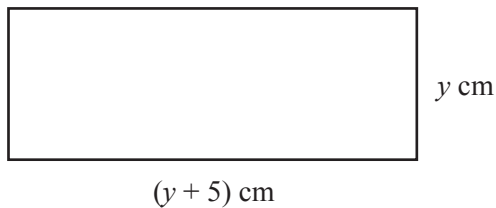
Find the price of an adult ticket.

$\$$ [4]

- (b) (i) Factorise $y^2 + 5y - 84$.

..... [2]

(ii)



NOT TO
SCALE

The area of the rectangle is 84 cm^2 .

Find the perimeter.

..... cm [3]

- (c) In a shop, the price of a monthly magazine is $\$m$ and the price of a weekly magazine is $\$(m - 0.75)$.
 One day, the shop receives
- \$168 from selling monthly magazines
 - \$207 from selling weekly magazines.
- The total number of these magazines sold during this day is 100.

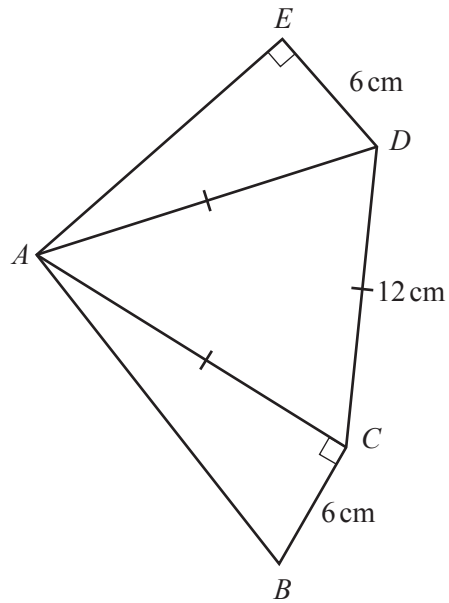
(i) Show that $50m^2 - 225m + 63 = 0$.

[3]

- (ii) Find the price of a monthly magazine.
 Show all your working.

\$ [3]

6 (a)

NOT TO
SCALE

In the pentagon $ABCDE$, angle $ACB = \text{angle } AED = 90^\circ$.
 Triangle ACD is equilateral with side length 12 cm.
 $DE = BC = 6$ cm.

(i) Calculate angle BAE .

Angle $BAE = \dots\dots\dots$ [4]

(ii) Calculate AB .

$AB = \dots\dots\dots$ cm [2]

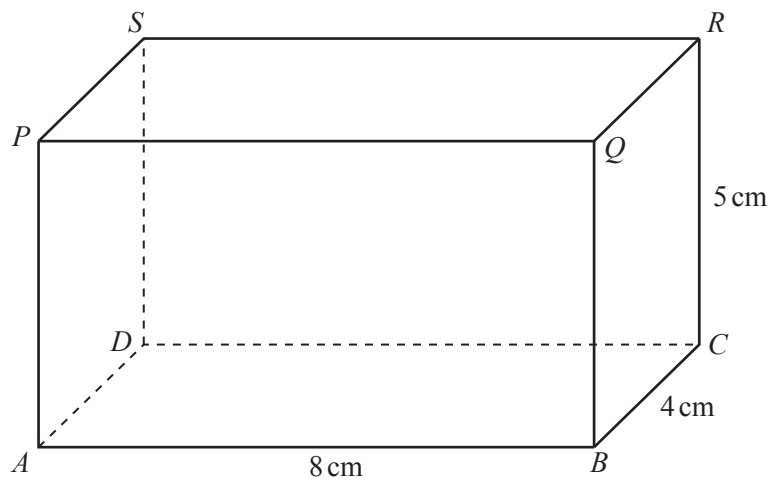
(iii) Calculate AE .

$AE = \dots\dots\dots$ cm [3]

- (iv) Calculate the area of the pentagon.

..... cm^2 [4]

(b)



NOT TO
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The diagram shows a cuboid.
 $AB = 8 \text{ cm}$, $BC = 4 \text{ cm}$ and $CR = 5 \text{ cm}$.

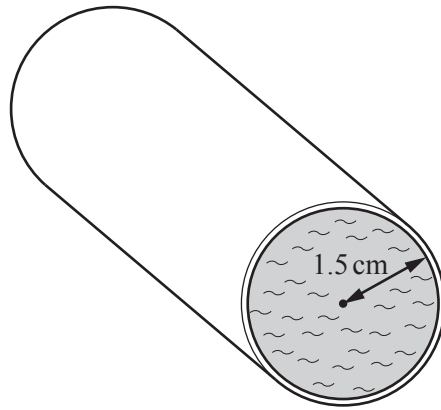
- (i) Write down the number of planes of symmetry of this cuboid.

..... [1]

- (ii) Calculate the angle between the diagonal AR and the plane $BCRQ$.

..... [4]

7 (a)

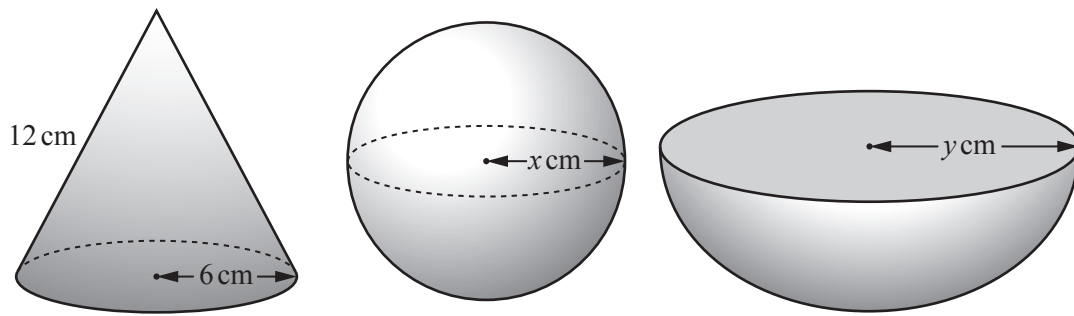
NOT TO
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Water flows through a cylindrical pipe at a speed of 8 cm/s.
The radius of the circular cross-section is 1.5 cm and the pipe is always completely full of water.

Calculate the amount of water that flows through the pipe in 1 hour.
Give your answer in litres.

..... litres [4]

(b)

NOT TO
SCALE

The diagram shows three solids.

The base radius of the cone is 6 cm and the slant height is 12 cm.

The radius of the sphere is x cm and the radius of the hemisphere is y cm.

The **total** surface area of each solid is the same.

- (i) Show that the total surface area of the cone is $108\pi \text{ cm}^2$.

[The curved surface area, A , of a cone with radius r and slant height l is $A = \pi rl$.]

[2]

- (ii) Find the value of x and the value of y .

[The surface area, A , of a sphere with radius r is $A = 4\pi r^2$.]

$x = \dots\dots\dots$

$y = \dots\dots\dots$ [4]

8 (a) $\mathbf{M} = \begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} 1 & 2 \end{pmatrix}$ $\mathbf{P} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$

- (i) For the following calculations, put a tick (✓) if it is possible or put a cross (✗) if it is not possible. There is no need to carry out any of the calculations.

Calculation	✓ or ✗
$\mathbf{N} + \mathbf{P}$	
$\mathbf{NP}$	
$\mathbf{M}^2$	
$\mathbf{N}^2$	
$\mathbf{MN}$	
$\mathbf{NM}$	

[4]

- (ii) Work out $\begin{pmatrix} 1 \\ 2 \end{pmatrix} + \mathbf{P}$.

..... [1]

- (iii) Work out $\mathbf{PN}$.

..... [2]

- (iv) Work out $\mathbf{M}^{-1}$.

..... [2]

- (b) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$.

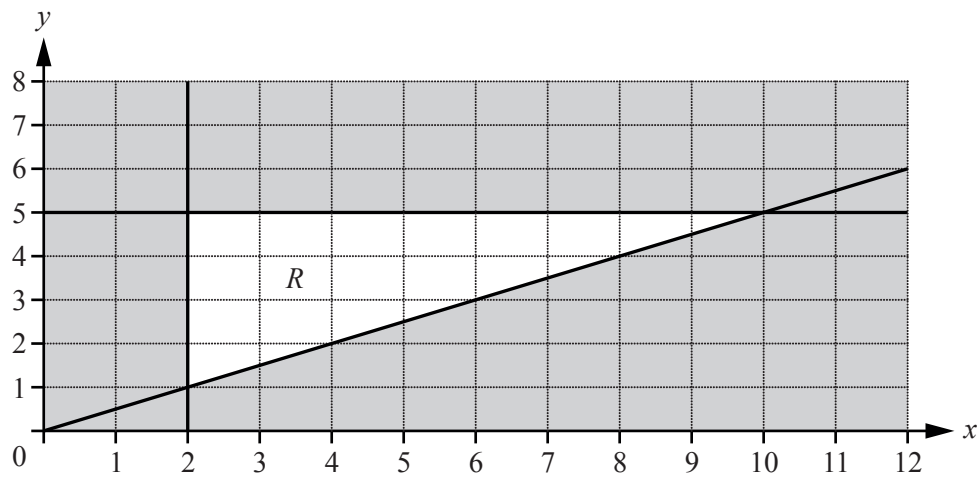
.....

..... [3]

- 9 (a) Find the equation of the straight line that is perpendicular to the line $y = \frac{1}{2}x + 1$ and passes through the point (1, 3).

..... [3]

(b)



- (i) Find the three inequalities that define the region R .

.....

 [4]

- (ii) Find the point (x, y) , with integer co-ordinates, inside the region R such that $3x + 5y = 35$.

(..... ,) [2]

10 (a) $f(x) = 2x - 3$ $g(x) = x^2 + 1$

(i) Find $gg(2)$.

..... [2]

(ii) Find $g(x+2)$, giving your answer in its simplest form.

..... [2]

(iii) Find x when $f(x) = 7$.

$x =$ [2]

(iv) Find $f^{-1}(x)$.

$f^{-1}(x) =$ [2]

(b) $h(x) = x^x, x > 0$

- (i) Calculate $h(0.3)$.
Give your answer correct to 2 decimal places.

..... [2]

- (ii) Find x when $h(x) = 256$.

$x =$ [1]

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