YIO CHU KANG SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2018
SECONDARY TWO EXPRESS

MATHEMATICS
Paper 1

1 hour

8 October 2018 (Monday)

READ THESE INSTRUCTIONS FIRST

Candidates answer on the Question Paper.

Write your index number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions.
The number of marks is given in brackets [ ] at the end of each question or part question.

If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
The total of the marks for this paper is 40.

The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π, use either your calculator value or 3.142.

For Examiner's Use

40
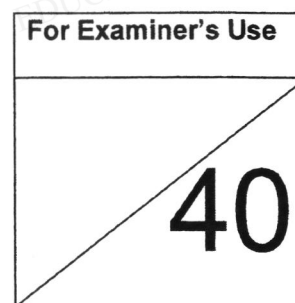
Setter: Miss Chia Yi Ying

This document consists of **13** printed pages and **3** blank pages.

Mathematical Formulae

Compound interest

$$\text{Total Amount} = P(1 + \frac{r}{100})^n$$

Mensuration

Curved surface area of a cone = $\pi r l$

Surface area of sphere = $4\pi r^2$

Volume of cone = $\frac{1}{3}\pi r^2 h$

Volume of sphere $\frac{4}{3}\pi r^3$

1   During a production, a batch of 25 light bulbs were produced. In this batch, 5 light bulbs were defective. One bulb was chosen at random. It was defective and thrown away. A second bulb was chosen at random.

Find the probability that the second bulb was not defective.

Answer .... [2]

2   Factorize $4ab - 10c + 6a^2b - 15ac$ completely.

Answer .... [2]

3   Write down the coordinates of the points where the curve $y = (4x+1)(1-x)$ meets the x-axis.

Answer (................... , ...) [1]

and

(................... , ...) [1]

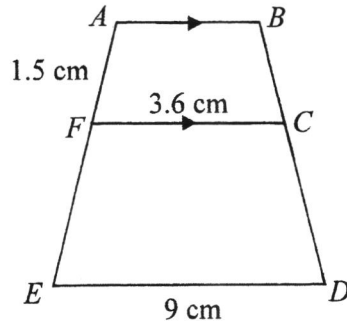**4** The diagram below shows a vertical flagpole *PC* placed at the top of the hill. *B* is vertically below *C* and angle *ABC* = 90°, angle *PAB* = 18°, *AB* = 120 m and *AC* = 125 m.
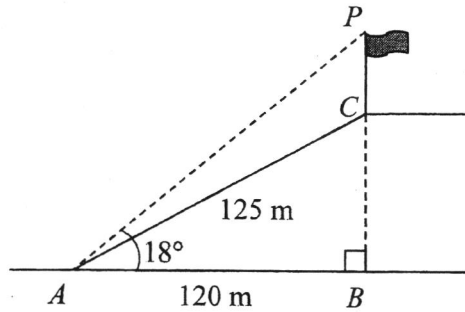
Find the height of the flagpole.

Answer .... m   [3]

5 The diagram below shows two similar trapeziums, *ABCF* and *FCDE*.

Given that *FC* = 3.6 cm, *DE* = 9 cm and *AF* = 1.5 cm, find the

(a) value of $\dfrac{AB}{FC}$,

Answer .... [1]

(b) the length of *FE*.

Answer .... cm [2]

6
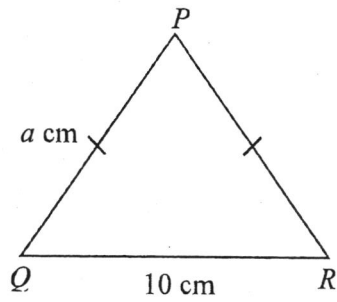
In the diagram above, triangle PQR is an isosceles triangle with $PQ = PR = a$ cm and $QR = 10$ cm.

(a) Express in terms of a,

    (i) the value of $\cos \angle PQR$,

Answer .... [1]

    (ii) the shortest distance from P to QR.

Answer .... cm [1]

(b) Given that $a = 13$, find the value of $\sin \angle PRQ$.
Leave your answer as a fraction.

Answer .... [2]

7   Factorise fully

   (a) $32wu^2 - 18wv^2$,

                        Answer .... [2]

   (b) $3x^2 - 13x - 30$.

                        Answer .... [2]
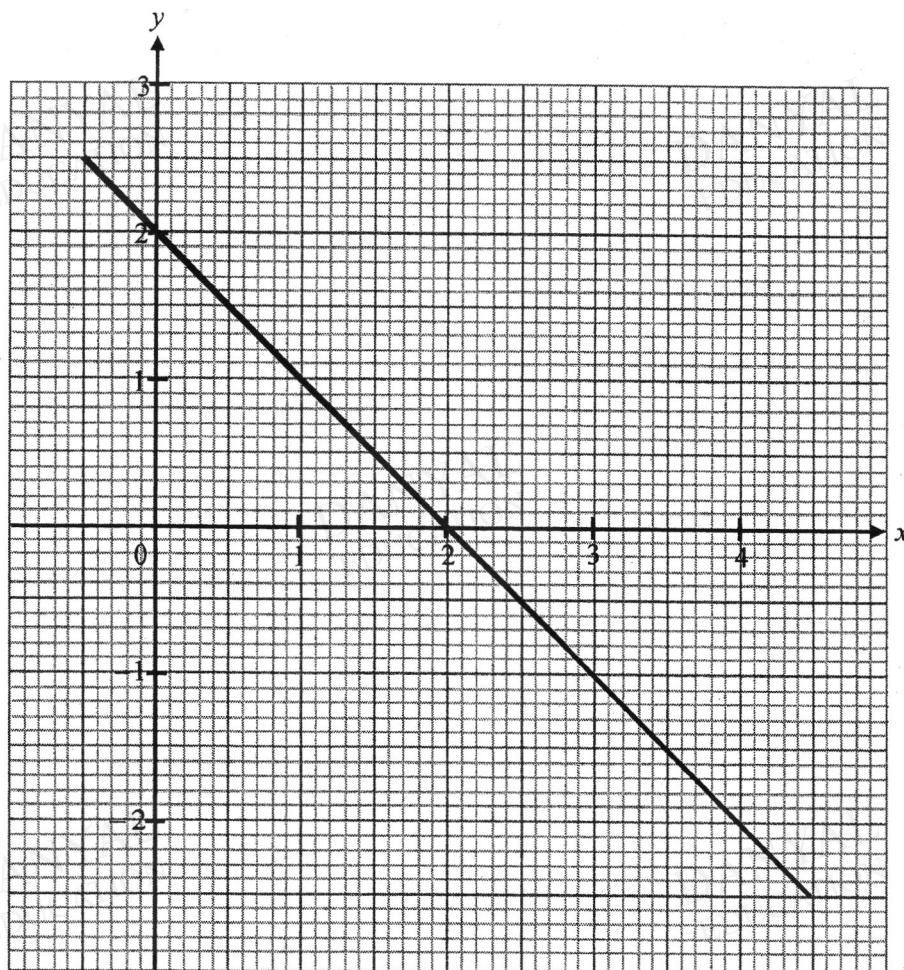
8 The graph of $y + x = 2$ is drawn on the grid below.

(a) Complete the table for $y = x$ and draw its graph on the grid below.

x	0	1	2
y			

[2]

(b) From the graph, solve the following simultaneous equations.

$$y + x = 2$$
$$y = x$$

Answer $x =$ .... [1]

$y =$ .... [1]

9 The force of attraction, F (in N), between 2 magnets is inversely proportional to the square of the distance, x (in cm), between the magnets. When the magnets are 2 cm apart, the force is 5 N.

(a) Find the equation connecting F and x.
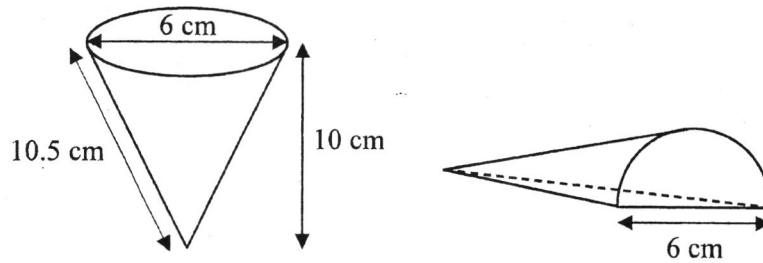
Answer .... [2]

(b) Find the percentage decrease in the force of attraction when the distance between them is doubled.

Answer .... % [2]

10 A rubber cone of diameter 6 cm, height 10 cm and slant height 10.5 cm is cut in half to make two rubber door stoppers.

Find

(a) the volume of **each** rubber stopper,

Answer .... cm^3 [2]

(b) the surface area of **each** rubber stopper.

Answer .... cm^2 [2]

11 **(a)** Expand $(a+b)(a-b)$.

Answer .... [1]

(b) Without using a calculator, use algebraic rules to evaluate $\dfrac{121}{121^2 - 125 \times 117}$.

Leave your answer as a fraction.

Answer .... [3]

12 The back-to-back stem-and-leaf diagram shows the Test 1 and Test 2 scores of a class of 10 students.

Leaves for Test 1 scores	Stem	Leaves for Test 2 scores
7 4	3	
3 1 0	4	9
9 8 1	5	8
7 3	6	0 3 5 6
	7	4 4
	8	0 3

Stem | Leaves
Key: 3 | 4   means 34 marks

(a) Given that the passing marks for both tests is 50, find the percentage of students who passed

   (i) Test 1,

Answer .... %   [1]

   (ii) Test 2.

Answer .... %   [1]

(b) Find the ratio of students who score above 50 but less than 65 in Test 2 to those in Test 1.

Answer .... : ....   [1]

(c) Which test is easier?
Give a reason to justify your answer.

....

....

....[1]

YIO CHU KANG SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2018
SECONDARY TWO EXPRESS

MATHEMATICS
Paper 2

1 hour 30 minutes

Additional materials: Answer Paper
                     Graph Paper (1 sheet)

11 October 2018 (Thursday)

READ THESE INSTRUCTIONS FIRST

Write your index number and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in loss of marks.

The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 60.

For Examiner's Use

60

Setter: Madam Lee Ching Fong

This document consists of **6** printed pages and **2** blank pages.

Mathematical Formulae

Mensuration

Curved surface area of a cone = $\pi r l$

Surface area of a sphere = $4\pi r^2$

Volume of a cone = $\dfrac{1}{3}\pi r^2 h$

Volume of a sphere = $\dfrac{4}{3}\pi r^3$

1   The quantity of paint needed to cover the outside of a container is proportional to the square of the depth of the container.

When the depth is 50 cm, the quantity of paint needed is 1500 ml.

Calculate

(a)   the quantity of paint needed when the depth is 70 cm.   [2]

(b)   the depth when the quantity of paint needed is 540 ml.   [2]

---

2   The following table shows the age group of members of a country club.

Age (years)	$35 < x \le 40$	$40 < x \le 45$	$45 < x \le 50$	$50 < x \le 55$	$55 < x \le 60$
No. of members	20	k	75	80	90

(a)   Write down the largest value of k such that $55 < x \le 60$ is the modal age group.   [1]

(b)   Write down the smallest value of k such that the median group is $45 < x \le 50$.   [1]

(c)   If $k = 50$, find the mean age group, correct to 2 decimal places.   [2]

---

3   An actual distance of 60 km between two points on a map is represented by a length of 20 cm.

(a)   Find the scale of the map in the form of $1 : n$.   [1]

(b)   Given that a circular field has an area of 12.5 cm² on the map, calculate the actual diameter of the field.   [3]

---

4   Jennifer drove 4 hours at an average speed of x km/h and then for 6 hours at an average speed of y km/h.

She drove a total distance of 816 km.

(a)   Write down an equation in terms of x and y, and show that it simplifies to
$2x + 3y = 408$.   [1]

(b)   Kenny drove for 3 hours at an average speed of x km/h and then for 5 hours at an average speed of y km/h.

He drove a total distance of 654 km.

Write down an equation, in terms of x and y, to represent these information.   [1]

(c)   Solve these two equations to find the value of x and of y.   [3]

5 **(a)** It is given that $a = \dfrac{4b - 5c}{b + c}$.

      (i) Find a when $b = 4$ and $c = -1$.   [1]

      (ii) Express b in terms of a and c.   [2]

  (b) Given that $(2x - 2y)^2 = 16$ and $x^2 + y^2 = 8$, find the value of xy.   [3]

---

6 The diagram shows a circular area. Three points, P, Q and R are on the circumference of the circle and O is the centre of the circle.
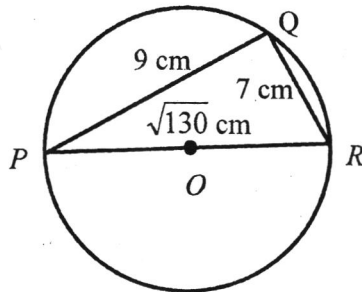
  (a) Show that triangle PQR is a right angled triangle.   [2]

  (b) Hence, find the area of triangle PQR.   [2]

  (c) An object falls within the circular area, find the probability that the object will land within triangle PQR. Leave your answer in 3 significant figures.   [2]

---

7 **(a)** Expand and simplify $(2 - 5x)^2 - (x - 2)(2x + 1)$.   [2]

  (b) Simplify $\dfrac{x^2 - 9}{x^2 - 4x - 21} \div \dfrac{3x - 6}{3x - 21}$.   [2]

  (c) Express as a single fraction in its simplest form $\dfrac{3}{(5 - x)} - \dfrac{5}{(x - 5)^2}$.   [3]

---

8 Two triangles, A and B, each has a vertical height of x cm and $(x + 3)$ cm respectively.
The area of the triangles A and B are 30 cm² and 32 cm² respectively.

Triangle A Triangle B
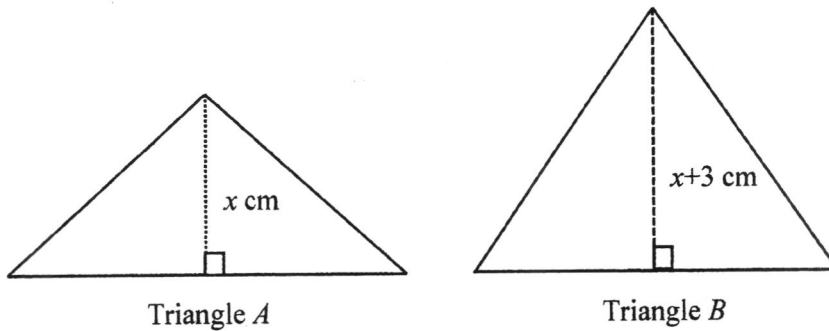
(a) Find, in terms of x, an expression for the length of the base of

    (i) triangle A,   [1]

    (ii) triangle B.   [1]

(b) Given that the length of the base of tringle A is 4 cm more than that of triangle B, form
an equation in x and show that it reduces to $x^2 + 4x - 45 = 0$.   [3]

(c) Solve the equation and find the vertical height of triangle B.   [3]

---

9 **Answer the whole of this question on a sheet of graph paper.**

The variables x and y are connected by the equation

$$y = 4x^2 - 40x + 100.$$

Some corresponding values of x and y are given in the following table.

x	2	3	4	5	6	7	8
y	36	p	4	0	4	16	36

(a) Find the value of p.   [1]

(b) Using a scale of 2 cm to represent 1 unit on the horizontal x-axis and 2 cm to
represent 5 units on the vertical y-axis, draw the graph of $y = 4x^2 - 40x + 100$ for
$2 \leq x \leq 8$.   [3]

(c) From the graph, find the

    (i) equation of the line of symmetry,   [1]

    (ii) values of x when $y = 25$,   [2]

    (iii) coordinates of the minimum point.   [1]

---

10 (a) The candle in diagram I can be modelled by the pyramid *ABCDE* in diagram II.
ABCD is a square of side 8 cm and *AE* = *BE* = *CE* = *DE* = 10 cm.
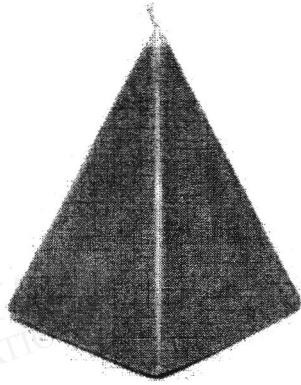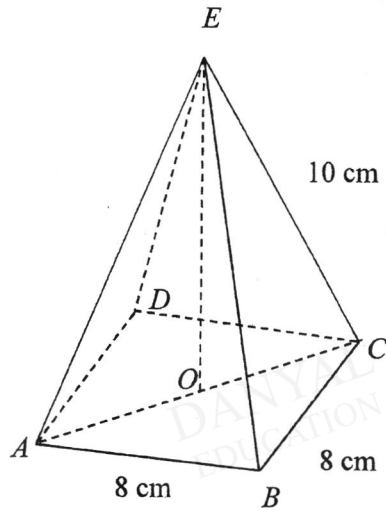

Diagram I   Diagram II

(i) Calculate the height of the candle, *EO*. [2]

(ii) Calculate the amount of wax needed to make one candle. [2]

(b) Another candle is made in the shape of a **hemisphere**.
The volume of this candle is the same as the volume of candle *ABCDE*.

Show that the radius of the hemisphere is 4.38 cm, correct to 3 significant figures. [2]

(c) The diagram shows the plan view of a box holding six of the hemispherical candles.
The box is in the shape of a cuboid and the candles just fit into the box.
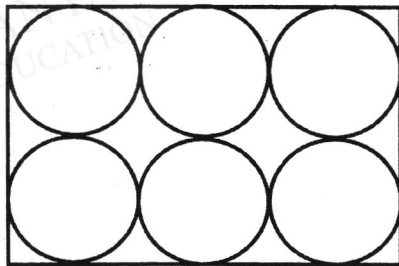
Calculate the volume of the box. [2]

1 $\quad$ Probability $= \dfrac{25-5}{25-1}$ $\qquad\qquad$ [M1]

$\qquad\qquad\quad = \dfrac{5}{6}$ $\qquad\qquad\qquad$ [A1]

---

2 $\quad 4ab - 10c + 6a^2b - 15ac$

$= 4ab + 6a^2b - 10c - 15ac$

$= 2ab(2+3a) - 5c(2+3a)$ $\qquad$ [M1]

$= (2+3a)(2ab - 5c)$ $\qquad\qquad$ [A1]

---

3 $\quad \left(-\dfrac{1}{4}, 0\right)$ $\qquad\qquad\qquad\qquad$ [B1]

and

$(1, 0)$ $\qquad\qquad\qquad\qquad\qquad$ [B1]

---

4 $\qquad \tan 18° = \dfrac{PB}{120}$

$\qquad\qquad PB = 120 \times \tan 18°$

$\qquad\qquad\quad = 38.990 \ (5 \text{ s.f.})$ $\qquad$ [M1]

$\qquad$ By the Pythagoras' Theorem,

$\qquad 125^2 = 120^2 + BC^2$

$\qquad BC^2 = 125^2 - 120^2$

$\qquad BC = \sqrt{125^2 - 120^2}$ $\qquad\qquad$ [M1]

$\qquad\quad = 35$

$\qquad$ Height of flagpole $= 38.990 - 35$

$\qquad\qquad\qquad = 3.990$

$\qquad\qquad\qquad = 3.99 \text{ m} \ (3 \text{ s.f.})$ $\qquad$ [A1]

---

5 $\quad$ **(a)** $\quad \dfrac{AB}{FC} = \dfrac{FC}{ED}$

$\qquad\qquad\quad = \dfrac{3.6}{9}$

$\qquad\qquad\quad = \dfrac{2}{5}$ $\qquad\qquad\qquad\qquad$ [A1]

$\quad$ **(b)** $\quad \dfrac{FE}{AF} = \dfrac{ED}{FC}$

$\qquad\qquad \dfrac{FE}{1.5} = \dfrac{9}{3.6}$ $\qquad\qquad\qquad$ [M1]

$\qquad\qquad\quad FE = \dfrac{9}{3.6} \times 1.5$

$\qquad\qquad\qquad = 3.75 \text{ cm}$ $\qquad\qquad$ [A1]

6 (a) (i)

$$\cos \angle PQR = \frac{10 \div 2}{a}$$

$$= \frac{5}{a} \quad \text{[B1]}$$

(ii)

$$\text{shortest distance} = \sqrt{a^2 - 5^2}$$

$$= \sqrt{a^2 - 25} \quad \text{[B1]}$$

(b)

$$\sin \angle PRQ = \frac{\sqrt{a^2 - 25}}{a}$$

$$= \frac{\sqrt{13^2 - 25}}{13} \quad \text{[M1]}$$

$$= \frac{12}{13} \quad \text{[A1]}$$

7 (a)

$$32wu^2 - 18wv^2 = 2w\left(16u^2 - 9v^2\right) \quad \text{[M1]}$$

$$= 2w(4u + 3v)(4u - 3v) \quad \text{[A1]}$$

(b)

	$3x$	5	$5x$
x		-6	$-18x$
	$3x^2$	-30	$-13x$

[M1]

$$3x^2 - 13x - 30 = (3x + 5)(x - 6) \quad \text{[A1]}$$

8 (a)

x	0	1	2
y	0	1	2

[T1]

points plotted correctly and line drawn correctly with label [L1]

(b) $x = 1$ [B1]

$y = 1$ [B1]

9 (a)

$$F = \frac{k}{x^2}$$

When $F = 5$, $x = 2$,

$$5 = \frac{k}{2^2}$$

$$k = 2^2 \times 5$$

$$k = 20 \quad \text{[M1]}$$

$$\therefore F = \frac{20}{x} \quad \text{[A1]}$$

9 (b)   new $F = \dfrac{20}{(2x)^2}$

percentage decrease $= \dfrac{\dfrac{20}{x^2} - \dfrac{20}{(2x)^2}}{\dfrac{20}{x^2}} \times 100\%$ [M1]

$= 75\%$ [A1]

---

10 (a)   Volume $= \dfrac{1}{2} \times \dfrac{1}{3} \times \pi \times \left(\dfrac{6}{2}\right)^2 \times 10$ [M1]

$= 47.123$ (5 s.f.)

$= 47.1 \text{ cm}^3$ (3 s.f.)   [A1]

(b)   Surface area $= \left[\dfrac{1}{2} \times (\pi \times 3^2 + \pi \times 3 \times 10.5)\right] + \left[\dfrac{1}{2} \times 6 \times 10\right]$ [M1]

$= 93.617$ (5 s.f.)

$= 93.6 \text{ cm}^2$ (3 s.f.)   [A1]

---

11 (a) $a^2 - b^2$ [B1]

(b) $\dfrac{121}{121^2 - 125 \times 117} = \dfrac{121}{121^2 - (121+4)(121-4)}$ [M1]

$= \dfrac{121}{121^2 - (121^2 - 4^2)}$ [M1]

$= \dfrac{121}{121^2 - 121^2 + 4^2}$

$= \dfrac{121}{16}$ [A1]

---

12 (a) (i)   percentage $= \dfrac{5}{10} \times 100\%$

$= 50\%$ [A1]

(ii)   percentage $= \dfrac{9}{10} \times 100\%$

$= 90\%$ [A1]

(b) $3 : 4$ [A1]

(c)   Test 2 is easier.
The percentage of students who passed Test 2 is higher than that of Test 1.   [B1]

285

1 **(a)** $V = kd^2$

When $d = 50cm$, $V = 1500ml$,

$1500 = k(50)^2$

$k = \dfrac{1500}{50^2}$

$\quad = \dfrac{3}{5}$

$V = \dfrac{3}{5}d^2$

When $d = 70$ cm

$V = \dfrac{3}{5} \times 70^2$ [M1]

$\quad = \mathbf{2940}$ ml [A1]

(b) When $V = 540ml$,

$\dfrac{3}{5}d^2 = 540$

$d^2 = \dfrac{540 \times 5}{3}$ [M1]

$\quad = 900$

$d = \pm\sqrt{900}$

$\quad = \pm 30$ cm

$d = \mathbf{30}$ cm [A1]

2 **(a)** $k < 90$

Largest value of $k = \mathbf{89}$ [A1]

(b) $k + 20 + 74 = 80 + 90$

$k = 170 - 94$

$\quad = 76$ [A1]

Smallest value of $k = \mathbf{76}$

(c) Mean age group $= \dfrac{37.5 \times 20 + 42.5 \times 50 + 47.5 \times 75 + 52.5 \times 80 + 57.5 \times 90}{20 + 50 + 75 + 80 + 90}$ [M1]

$\quad = \dfrac{15812.5}{315}$

$\quad = 50.1984$

$\quad = \mathbf{50.20}$ (2 dp) [A1]

3 **(a)** 20 cm : 60 km

1 cm : 300 000 cm

1 : 300 000 [A1]

(b) 1 cm : 3 km

$(1 \text{ cm})^2 : (3 \text{ km})^2$

$1 \text{ cm}^2 : 9 \text{ km}^2$

(b)   Actual area $= 12.5 \times 9$ [M1]
$$= 112.5 \ \text{km}^2$$

$$\pi r^2 = 112.5 \qquad\qquad\qquad\text{[M1]}$$
$$r^2 = \frac{112.5}{\pi}$$
$$r = \sqrt{\frac{112.5}{\pi}}$$
$$= 5.9841$$

$$d = 2 \times 5.9841$$
$$= 11.968 \ \text{km}$$
$$= 12.0 \ \text{km (3 sf)} \qquad\qquad \text{[A1]}$$

---

4   **(a)** $4x + 6y = 816$

$2x + 3y = 408$ (shown)   [B1]

(b) $3x + 5y = 654$ [B1]

(C) $2x + 3y = 408$ -----(1)

$3x + 5y = 654$ -----(2)

$(1) \times 3 \Rightarrow 6x + 9y = 1224$ ------(3)

$(2) \times 2 \Rightarrow 6x + 10y = 1308$ ----- (4)

$(4) - (3) \Rightarrow (6x + 10y) - (6x + 9y) = 1308 - 1224$

$y = 84$ [M1]

Substitute $y = 84$ into (1)   [A1]

$2x + 3(84) = 408$

$2x = 408 - 252$

$= 156$

$x = \dfrac{156}{2}$

$= 78$ [A1]

$\therefore x = 78, \ y = 84$

---

5   **(a)**   **(i)** $a = \dfrac{4b - 5c}{b + c}$

$$= \frac{4(4) - 5(-1)}{4 + (-1)}$$

$$= \frac{16 + 5}{3}$$
$$= 7$$

       [A1]

(ii) $a = \dfrac{4b - 5c}{b + c}$

$a(b + c) = 4b - 5c$ [M1]

$ab + ac = 4b - 5c$

$ab - 4b = -5c - ac$

$b(a - 4) = -5c - ac$

$b = \dfrac{-5c - ac}{a - 4}$ or $b = \dfrac{-c(5 + a)}{a - 4}$ [A1]

(b) $(2x - 2y)^2 = 16$

$4x^2 - 8xy + 4y^2 = 16$

$x^2 - 2xy + y^2 = 4$

$x^2 + y^2 - 2xy = 4$ [M1]

Given $x^2 + y^2 = 8$

$8 - 2xy = 4$ [M1]

$-2xy = 4 - 8$

$xy = \dfrac{4 - 8}{-2}$

$= 2$ [A1]

---

6 (a) $PQ^2 + QR^2 = 9^2 + 7^2$

$= 130$ [M1]

$PR^2 = (\sqrt{130})^2$

$= 130$

$PQ^2 + QR^2 = PR^2$ [A1]

$\therefore$ Triangle PQR is a right-angled triangle.

(b) Area of triangle $PQR = \dfrac{1}{2} \times 9 \times 7$ [M1]

$= 31.5 \text{ cm}^2$ [A1]

6 (c) $P_{(triangle\ PQR)} = \dfrac{31.5}{\pi(\dfrac{\sqrt{130}}{2})^2}$ [M1]

$= \dfrac{31.5}{\dfrac{\pi(130)}{4}}$

$= 0.3085$

$= 0.309$ (3sf)   [A1]

7 **(a)**

$$(2-5x)^2 - (x-2)(2x+1) = 4-20x+25x^2 - [2x^2+x-4x-2] \qquad \text{[M1]}$$
$$= 4-20x+25x^2-2x^2-x+4x+2$$
$$= 23x^2-17x+6 \qquad \text{[A1]}$$

(b)

$$\frac{x^2-9}{x^2-4x-21} \div \frac{3x-6}{3x-21} = \frac{(x+3)(x-3)}{(x-7)(x+3)} \times \frac{3(x-7)}{3(x-2)} \qquad \text{[M1]}$$

$$= \frac{x-3}{x-2} \qquad \text{[A1]}$$

(c)

$$\frac{3}{(5-x)} - \frac{5}{(x-5)^2}$$

$$= -\frac{3}{x-5} - \frac{5}{(x-5)^2} \qquad \text{[M1]}$$

$$= \frac{-3(x-5)-5}{(x-5)^2}$$

$$= \frac{-3x+15-5}{(x-5)^2} \qquad \text{[M1]}$$

$$= \frac{-3x+10}{(x-5)^2} \qquad \text{[A1]}$$

---

8 **(a)** **(i)** Base of triangle $A = \dfrac{2 \times 30}{x}$

$$= \frac{60}{x} \qquad \text{[B1]}$$

(ii) Base of triangle $B = \dfrac{2 \times 32}{x+3}$

$$= \frac{64}{x+3} \qquad \text{[B1]}$$

(b) Given that the base of triangle A is 4 cm more than the base of triangle B,

$$\frac{60}{x} - \frac{64}{x+3} = 4 \qquad \text{[M1]}$$

$$\frac{60(x+3)-64x}{x(x+3)} = 4 \qquad \text{[M1]}$$

$$60x+180-64x = 4x^2+12x$$
$$4x^2+12x+4x-180 = 0$$
$$4x^2+16x-180 = 0$$
$$x^2+4x-45 = 0 \quad \text{(shown)} \qquad \text{[A1]}$$

(c)

$$x^2+4x-45 = 0$$
$$(x-5)(x+9) = 0 \qquad \text{[M1]}$$
$$(x-5) = 0 \quad \text{or} \quad (x+9) = 0$$
$$x = 5 \quad \text{or} \quad x = -9 \qquad \text{[M1]}$$

The vertical height of triangle $B = x+3$ cm
$$= 5+3 \text{ cm}$$
$$= 8 \text{ cm} \qquad \text{[A1]}$$
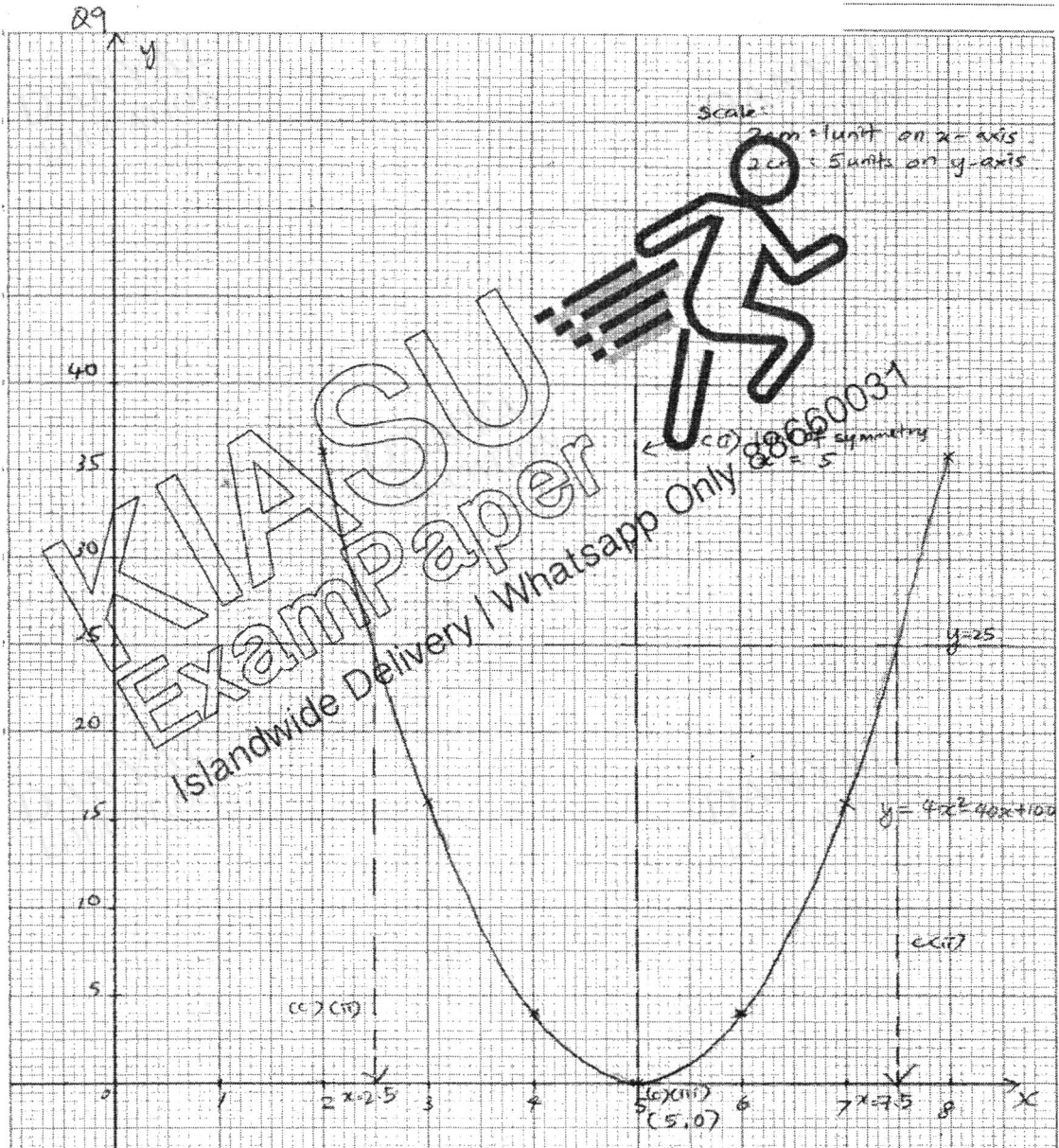
9 **(a)** $p = 16$ [B1]

(b) (See below)
Correct scale and axes [S1]
Points plotted correctly [P1]
Smooth curved line drawn with labelling [L1]

(c) **(i)** From the graph, equation of the line of symmetry is $x = 5$ [B1]

(ii) From the graph, $x = 2.5 \pm 0.1$ and $x = 7.5 \pm 0.1$ [B1]+[B1]

(iii) From the graph, coordinates of the minimum point is $(5, 0)$ [B1]

(b)

10 **(a)** **(i)**

$$AC = \sqrt{8^2 + 8^2} = \sqrt{128}$$

$$OC = \frac{\sqrt{128}}{2}$$

Height of pyramid $= \sqrt{10^2 - \left(\frac{\sqrt{128}}{2}\right)^2}$ **[M1]**

$= 8.2462$

$= 8.25$ cm (3sf) **[A1]**

(ii) **[M1]**

Volume of pyramid candle $= \frac{1}{3} \times 8^2 \times 8.2463$

$= 175.919$ cm^3

$= \mathbf{176\ cm^3}$ (3sf) **[A1]**

(b) Volume of hemisphere = volume of pyramid

$$\frac{2}{3} \times \pi r^3 = 175.919$$ **[M1]**

$$r^3 = \frac{175.919 \times 3}{2\pi}$$

$= 83.995$

$r = \sqrt[3]{83.995}$

$= 4.3794$ cm

$= \mathbf{4.38}$ cm (3sf) (shown) **[A1]**

(c) Length of box $= 6 \times 4.3794$ cm

$= 26.277$ cm

Breadth of box $= 4 \times 4.3794$ cm

$= 17.517$ cm

Height of box $= 4.3794$ cm

Volume of box $= 26.277 \times 17.517 \times 4.3794$ **[M1]**

$= 2015.9$ cm^3

$= \mathbf{2020\ cm^3}$ (3sf) **[A1]**