YUAN CHING SECONDARY SCHOOL
2015 MID YEAR EXAMINATION
SECONDARY TWO EXPRESS

MATHEMATICS
4048 / 01

NAME:_____( ) TIME: 1 hour

CLASS: Sec _____

READ THESE INSTRUCTIONS FIRST

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

Answer **all** questions.
If working is needed for any question it must be shown in the space below that question.
Omission of essential working will result in loss of marks.
You are expected to use a scientific calculator to evaluate explicit numerical expressions.
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 the marks for this paper is **40**.

40

This document consists of 7 printed pages.

Answer **all** the questions.

1 V is directly proportional to the square root of p. Given that $V = 36$ when $p = 16$, find

(a) an equation connecting V and p,

(b) the value of V when $p = 0.04$,

(c) the value of p when $V = \frac{1}{3}$.

Answer (a) ..... [2]

(b) $V =$ ..... [1]

(c) $p =$ ..... [1]

2 Expand and simplify the following.

(a) $(x + 2)(3x + 7)$,

(b) $6x^2 - x(1 - 2x)$.

Answer (a) ..... [1]

(b) ..... [1]

3 Factorise each of the following completely.

(a) $2x^2 + 9 + 9x$,

(b) $25x^2 - 100$,

(c) $x(y-1) + 1 - y$,

(d) $6mx - 3kx - 4ky + 8my$.

Answer (a) ..... [1]

(b) ..... [2]

(c) ..... [2]

(d) ..... [2]

4 **(a)** Given that $(x+y)^2 = 10$ and $x^2 + y^2 = 6$, find the value of xy.

(b) Evaluate the following using the special products of algebraic expressions.

(i) 99^2,

(ii) 103×97.

Answer (a) $xy =$ ..... [1]

(bi) ..... [2]

(bii) ..... [2]

5 Express each of the following as a single fraction in its simplest form.

(a) $\frac{x}{2} + \frac{x-5}{3}$,

(b) $\frac{5}{x} - \frac{4}{x+2}$.

Answer (a) ..... [1]

(b) ..... [2]

6 Simplify the following.

(a) $\frac{5y}{10x} \times \frac{6x^2y}{3xy^3}$

(b) $\frac{x^2+2x}{2x^2+x-6}$

Answer (a) ..... [1]

(b) ..... [2]

7 Given that $T = \sqrt{y - \frac{1}{2}x}$,

(a) express x in terms of y and T,

(b) hence, find the value of x when $y = 10.5$ and $T = \frac{2}{3}$.

Answer (a) $x =$ ..... [2]

(b) $w =$ ..... [1]

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8 It is given that $x = 4$ is a root of the equation $2x^2 - (k+1)x - 12 = 0$, where k is a constant. Find

(a) the value of k,

(b) the other root of the equation.

Answer (a) $k =$ ..... [2]

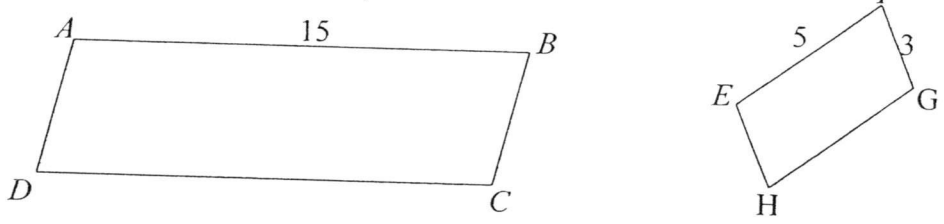
(b) $x =$ ..... [2]

9 Using the elimination method, solve the pair of simultaneous equations

$$7x - 3y = 4,$$
$$3y + 5x = 2.$$

Answer $x =$ ....., $y =$ ..... [3]

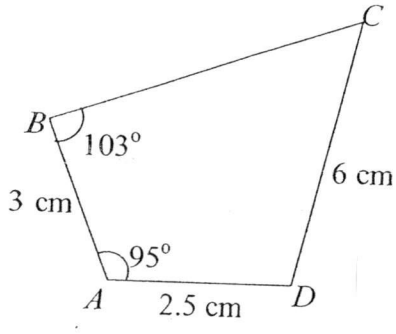
10 In the diagram, the parallelograms $ABCD$ and $EFGH$ are similar.
The dimensions given are in cm.
(a) Calculate the scale factor of enlargement/reduction,
(b) find the length of BC.
(The figures are not drawn to scale)

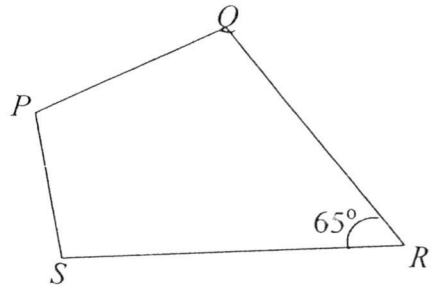


Answer (a) ..... [1]

(b) BC = ... cm [1]

11 Given that $ABCD$ is congruent to $PSRQ$, find
(a) the length of PS,
(b) $\angle PQR$.
(The figures are not drawn to scale.)





Answer (a) PS =.....cm [1]

(b) $\angle PQR$ = ... ° [2]

----- **END OF PAPER** -----

Efforts Today, Rewards Tomorrow

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Answer Key

Qn	Answers
1a	$V = 9\sqrt{p}$
1b	$V = 45$
1c	$\frac{1}{729}$
2a	$3x^2 + 13x + 14$
2b	$8x^2 - x$
3a	$(2x+3)(x+3)$
3b	$25(x-2)(x+2)$
3c	$(x-1)(y-1)$ or $(1-x)(1-y)$ or $-(x-1)(1-y)$ or $-(1-x)(y-1)$
3d	$(3x+4y)(2m-k)$
4a	$xy = 2$
4b	9801
4c	9991
5a	$\frac{5x-10}{6}$
5b	$\frac{x+10}{x^2+2x}$
6a	$\frac{1}{y}$
6b	$\frac{x}{2x-3}$
7a	$x = 2(y - T^2)$
7b	$x = 20\frac{1}{9}$
8a	$k = 4$
8b	$x = -1\frac{1}{2}$
9a	$x = \frac{1}{2}$
9b	$x = -\frac{1}{6}$
10a	Enlargement = 3, reduction = $\frac{1}{3}$
10b	$BC = 9$ cm
11a	$PS = 3$ cm
11b	$\angle PQR = 97°$

YUAN CHING SECONDARY SCHOOL
2015 MID-YEAR EXAMINATION
SECONDARY TWO EXPRESS

MATHEMATICS
4048 / 02

NAME:_____( ) **TIME: 1 hour 30 minutes**

CLASS: Sec _____

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The total number of the marks for this paper is **60**.

	60

This document consists of **4** printed pages.

[Turn Over

86

Answer **all** the questions.

1 **(a)** A map is drawn to a scale of 2 cm : 3 km.

(i) Express the scale of the map in the form $1 : r$. [1]

(ii) Calculate the actual area, in km^2, of a region Y, which is represented by $3\ cm^2$ on the map. [2]

(b) An area of $5\ cm^2$ on another map represents an actual area of $20\ km^2$. Calculate the actual distance, in km, represented by a length of 4 cm on the map. [2]

2 The rate, r, of a tap filling a tank is inversely proportional to the time, t, taken for the tank to be filled. When the rate is 6 l/min, the time taken is 12 minutes. If the rate is 16 l/min, find the time taken for the tank to be filled. [2]

3 Expand and simplify each of the following.

(a) $x(3x+2y)(c+d)$, [1]

(b) $2(4x-3)-(3x-1)^2$, [2]

(c) $(5y-3x+2)(-x-y)$. [2]

4 Using the special products of algebraic expressions of $a^2-b^2=(a+b)(a-b)$, factorise and simplify the expression $(x+y)^2-(x-y)^2$. [2]

5 Express the following as a single fraction in its simplest form.

(a) $\dfrac{3x^2y^3}{11u^2v} \div \dfrac{9xy^2}{11u^3v^2xy}$, [2]

(b) $\dfrac{8x-4x^2}{3y+5} \times \dfrac{5v+3vy}{(2-x)^2}$, [2]

(c) $\dfrac{7}{y-2} + \dfrac{y+3}{y^2+y-6}$, [2]

(d) $\dfrac{1}{(x+1)^2} + \dfrac{3(x-1)}{x+1} - 2$. [3]

6 The numerator of a fraction is 7 less than 3 times of its denominator. If 2 and 3 are added to the numerator and denominator respectively, the new fraction is equivalent to $\frac{7}{3}$. Find the original fraction.

[4]

7 Solve the following equations.

(a) $4x^2 - 24x + 36 = 0$,

[2]

(b) $(2x-5)^2 = 49$,

[3]

(c) $\frac{3}{x-2} = \frac{2x-1}{3}$.

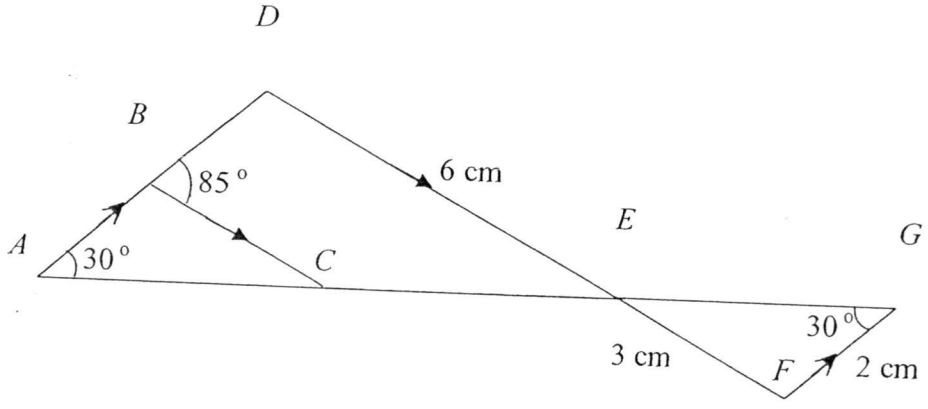
[3]

8 Solve the pair of simultaneous equations

[3]

$$x - 3y = 4,$$
$$2y + 5x = 3.$$

9 In the figure below, ΔABC and ΔGFE are congruent.



(a) Find $\angle ABC$,

[1]

(b) Find $\angle GFE$,

[1]

(c) Find the length of BC,

[1]

(d) State the triangle that is similar to ΔADE.

[1]

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10 Mr Eddie paid \$108 for some chairs. Each chair cost him \$$x$.

(a) Find an expression, in terms of x, for the number of chairs he bought. [1]

(b) He gave 2 of the chairs to a friend and sold all the remaining chairs each for \$2 more than its cost price.

(i) Find an expression, in terms of x, for the sum of money that he collected from the sale of the chairs. [2]

(ii) Mr Eddie made a profit of \$20 from the sale of the chairs. Form an equation, in terms of x, and show that it reduces to $x^2 + 12x - 108 = 0$. [3]

(iii) Solve the equation in **(b)(ii)** to find the number of chairs that Mr Eddie bought. [3]

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

The following table shows some of the values for the equation $y = x^2 - x + 1$.

x	-2	-1	0	1	2
y	7	3	1	k	3

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

(b) Using a scale of 4 cm to represent 1 unit for x-axis and 2 cm to represent 1 unit for y-axis, draw the graph $y = x^2 - x + 1$. [3]

(c) Using your graph, write down .

(i) the value of y when $x = 1.5$, [1]

(ii) the values of x when $y = 2.5$, [2]

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

(iv) the equation of the line of symmetry of the curve. [1]

----- **END OF PAPER** -----

Efforts Today, Rewards Tomorrow

Answer Key

Qn	Answers
1(a)(i)	1 : 1 500
1(a)(ii)	$6\frac{3}{4}$
1(b)	8 km
2	$t = 4\frac{1}{2}$ min
3(a)	$3cx^2 + 3dx^2 + 2cxy + 2dxy$
3(b)	$-9x^2 + 14x - 5$
3(c)	$3x^2 - 5y^2 = 2xy - 2x - 2y$
4	$4xy$
5(a)	$\frac{x^2y^2uv}{3}$
5(b)	$\frac{4xv}{2-x}$
5(c)	$\frac{8}{y-2}$
5(d)	$\frac{x^2-4x-6}{(x+1)^2}$
6	
7(a)	$x = 3$
7(b)	$x = 6$ or $x = -1$
7(c)	$x = 10$ or $x = -6$
8	$x = 1$ and $y = -1$
9(a)	$\angle ABC = 95°$
9(b)	$\angle GFE = 95°$
9(c)	$BC = 3$ cm
9(d)	$BD = 2$ cm
9(e)	ΔADC or ΔGFE
10(a)	$\frac{108}{x}$ chairs
10(b)(i)	$\left(\frac{108}{x} - 2\right)(x+2)$
10(b)(iii)	18 chairs

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BEATTY SECONDARY SCHOOL
END OF YEAR EXAMINATION 2015

SUBJECT : Mathematics **LEVEL : Sec 2 Express**

PAPER : 1 **DURATION : 1 hour 15 minutes**

SETTER : Mr Lee Chau Loong **DATE : 5 Oct 2015**

CLASS :	NAME :	REG NO :

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces on the top of this page.
Write in dark blue or black pen.
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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 **50**.

For Examiner's Use
50

This paper consists of 11 printed pages (including this cover page)

90

[Turn over

Answer **all** the questions

For aminer's Use

For Examiner Use

1 Expand and simplify $2(2-m)^2 - m(5-4m)$.

Answer : ..... [2]

2 The mean weight of 40 students in a class is 52.6 kilograms. After one student is removed from the class, the mean weight decreased to 52.2 kilograms.
Find the weight of the student who was removed from the class.

Answer : .....kg [2]

3 Given that $a-b=3$ and $ab=5$, find, without the use of a calculator,
the value of a^2+b^2.

Answer : ..... [2]

For Examiner's Use

4 y is inversely proportional to the square of x. When $x = 4$, $y = 0.25$.

(a) Find the values of x when $y = 25$.

Answer (a): $x =$ ..... [3]

(b) Describe the change in y when x is halved.

Answer (b): .....

.....

..... [1]

5 **(a)** Solve $3x^2 + 7x - 6 = 0$.

Answer (a): $x =$ ..... [2]

(b) Hence state the positive value of y for which $\frac{3}{y^2} + \frac{7}{y} - 6 = 0$.

Answer (b): $y =$ ..... [1]

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For xaminer's Use

For Examiner Use

6 Factorise completely

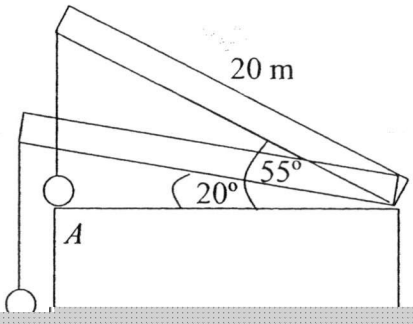
(a) $28x^2 - 343$

Answer (a): ..... [2]

(b) $6a^2 - 3ay - 8y + 16a$

Answer (b): ..... [2]

7 A crane arm 20 meters long lowers a parcel from A to B. When the parcel is at A, the crane arm makes an angle of 55° with the horizontal. When the parcel is at B, the crane arm makes an angle of 20° with the horizontal.
Find the vertical distance moved by the parcel.



he cashier

[1]

Examiner Use

Examiner's Use

9 The waiting times, to the nearest minute, of twelve customers queuing at t
of a supermarket are recorded as a list:

4, 3, 4, 2, 5, 3, 4, 1, 2, 6, 3, 4

(a) Complete the dot diagram.

Answer (a):

10 Each letter of the word "PIONEERS"is written on an identical card. The cards are then placed inside a box. Rainee picks a card at random from the box.

Find the probability that

(a) the letter P is chosen,

Answer (a): ..... [1]

(b) the letter A is chosen,

Answer (b): ..... [1]

(c) the letter E or S is chosen,

Answer (c): ..... [1]

(d) a letter with a horizontal line of symmetry is chosen.

Answer (d): ..... [1]

For xaminer's Use

For Examiner Use

11 Solve the following equations.

(a) $\dfrac{x+3}{7} - \dfrac{4x-5}{6} = x$

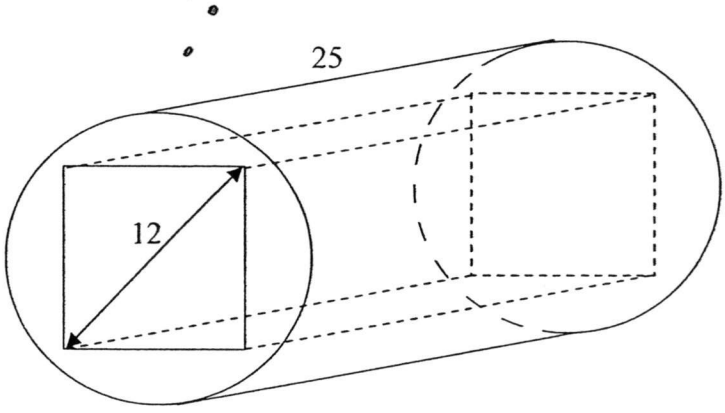
Answer (a): x = ... [2]

(b) $\dfrac{y-1}{y+2} = \dfrac{y}{3y+2}$

Answer (b): y = ... [3]

For Examiner's Use

12 A solid cylinder of base radius 8 cm and length 25 cm has a square cross section of diagonal 12 cm removed from the cylinder, as shown in the diagram.



Find the total surface area of the remaining solid.

Answer : ..... cm^2 [5]

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For Examiner's Use

For Examiner Use

13 The Day Safari charges \$$x$ for an adult ticket and \$$y$ for a child ticket.
The Lee family consists of 2 adults and 3 children. They paid a total of \$49.
The Lim family consists of 3 adults and 1 child. They paid a total of \$56.
Write down two equations in terms of x and y.
Hence find the value of x and of y.

Answer : $x =$ ....., $y =$ ..... [4]

14 Thomas measured the heights of 30 students in his class. The table below shows the results.

Heights (cm)	**Frequency**
$130 < h \leq 140$	6
$140 < h \leq 150$	k
$150 < h \leq 160$	8
$160 < h \leq 170$	5

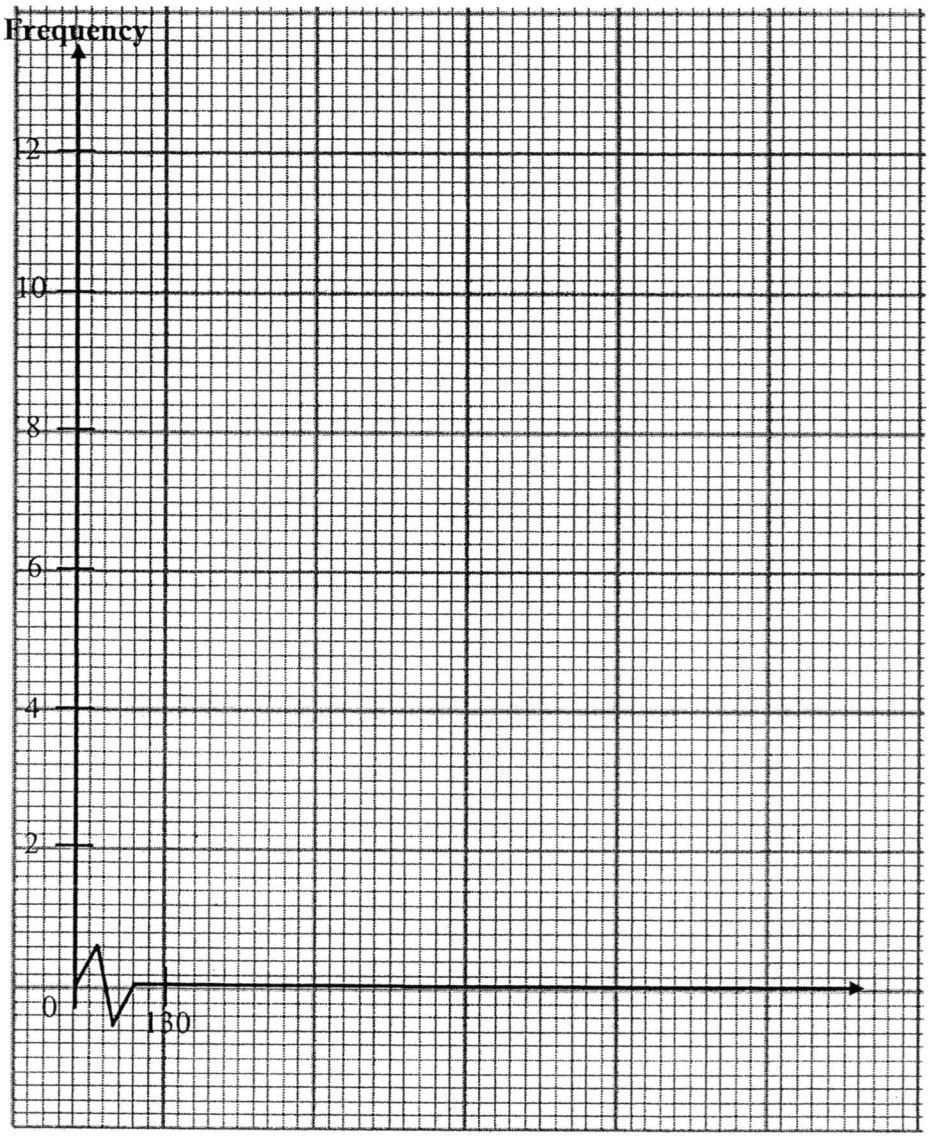
For Examiner's Use

14 **(a)** Find the value of k.

Answer (b): $k =$ ..... [1]

(b) On the grid below, draw the histogram representing the data.
Use a scale of 2 cm to 10 cm on the horizontal h-axis.

Answer (b): [2]



(c) Give one reason why a histogram is better than a pie chart.

Answer (c): .....

.....

..... [1]

For Examiner Use

End of Paper

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Answer Key

1. 14.4 km/h

2(a) 30° (b) 20° (c) 130°

3(a) 120° (b) 13 cm

4(a) $x = \frac{y}{2}$ (b) $m + n = 5q$

5(a) $a = -1$ (b) $c = -2$

6. $x = 6\frac{2}{3}$ cm

7(a) 70° (b) 70° (c) 110°

8(a) $5x + 5$ (b) $6x - 3$ (c) $\frac{4x+3}{6}$

9(a) 13.3 cm (b) 11.9 cm

10(a) 14.7 km (b) 6.75 kg

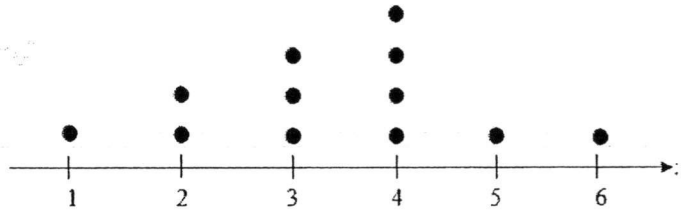
11(a) $a = 20$ (b) $b = 5.5$ (c) $c = 1$

12(a) $2x$ (b) $x + 3$ (c) $x = 7$

13(a) 4.47 m (b) 12 cm (c) 19.2 cm

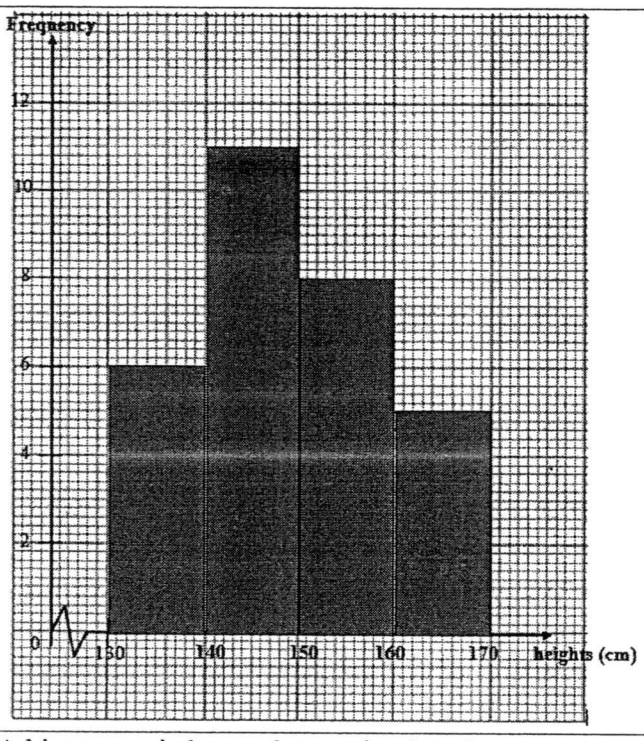
Solution and Mark Scheme

1.	$2(2-m)^2 - m(5-4m)$ $= 2(4-4m+m^2) - 5m + 4m^2$ $= 8 - 8m + 2m^2 - 5m + 4m^2$ $= 6m^2 - 13m + 8$	M1 A1
2.	$40 \times 52.6 - 39 \times 52.2 = 2104 - 2035.8 = 68.2\,\text{kg}$	M1, A1
3.	$a^2 + b^2 = (a-b)^2 + 2ab$ $= 3^2 + 2(5)$ $= 19$	 M1 A1
4(a)	$y = \frac{k}{x^2}$ When $x = 4$ and $y = 0.25$, $0.25 = \frac{k}{4^2}$ $k = 4$ Hence $y = \frac{4}{x^2}$ or $yx^2 = 4$ When $y = 25$, $25 = \frac{4}{x^2}$ $x^2 = \frac{4}{25}$ $x = -\frac{2}{5}$ or $\frac{2}{5}$	 M1 A1 A1
4(b)	When x is halved, the value of y is increased 4 times. Also accept: the value of y is multiplied by 4.	B1
5(a)	$3x^2 + 7x - 6 = 0$ $(3x-2)(x+3) = 0$ $x = \frac{2}{3}$ or $x = -3$	M1 A1
5(b)	$\frac{1}{y} = \frac{2}{3} \Rightarrow y = 1\frac{1}{2}$	B1

6(a)	$28x^2 - 343 = 7(4x^2 - 49)$ $= 7(2x-7)(2x+7)$	M1 A1
6(b)	$6a^2 - 3ay - 8y + 16a = 3a(2a-y) - 8(y-2a)$ $= 3a(2a-y) + 8(2a-y)$ $= (3a+8)(2a-y)$	M1 A1
7	$\sin 55° = \frac{x}{20} \Rightarrow x = 20\sin 55° = 16.383$ $\sin 20° = \frac{y}{20} \Rightarrow y = 20\sin 20° = 6.8404$ 16.383 – 6.8404 = 9.54 m (3 sf)	M1 M1 A1
8(a)	$\cos \angle PRQ = \frac{6}{15}$ $\angle PRQ = \cos^{-1}\left(\frac{6}{15}\right) = 66.4°$ (1 dp)	M1 A1
8(b)	Set $\frac{1}{3}(2^2)h = 20$ $h = \frac{3\times 20}{2^2} = 15$ cm	M1 A1
9(a)		B1 – all correct
9(b)	$\frac{3+4}{2} = 3.5$	B1
9(c)	4	B1
9(d)	Agree, because there are more dots from 1 to 3 minutes as compared to 5 to 6 minutes. Accept: The number of dots at 2 and 5 minutes are not equal. The number of dots at 3 and 4 minutes are not equal.	B1

10(a)	$\frac{1}{8}$	B1
10(b)	0	B1
10(c)	$\frac{3}{8}$	B1
10(d)	The letters with horizontal line of symmetry are I, O, E $\frac{4}{8}=\frac{1}{2}$	B1
11(a)	$\frac{x+3}{7}-\frac{4x-5}{6}=x$ $\frac{6(x+3)-7(4x-5)}{42}=x$ $6x+18-28x+35=42x$ $-22x+53=42x$ $64x=53$ $x=\frac{53}{64}$	M1 A1
11(b)	$\frac{y-1}{y+2}=\frac{y}{3y+2}$ $(y-1)(3y+2)=y(y+2)$ $3y^2-y-2=y^2+2y$ $2y^2-3y-2=0$ $(2y+1)(y-2)=0$ $y=-\frac{1}{2}$ or $y=2$	M1 M1 A1

12	Curved surface area = $2\pi(8)(25) = 400\pi$ or 1256.6 (5 sf) Let side of square be x cm. $x^2 + x^2 = 12^2$ $2x^2 = 144$ $x^2 = 72$ $x = \sqrt{72}$ or 8.4853 (5 sf) Two ends = $2\left[\pi(8)^2 - \left(\sqrt{72}\right)^2\right] = 2\left[64\pi - 72\right] = 128\pi - 144$ or 258.12 (5 sf) Four rectangles = $4\left[\sqrt{72} \times 25\right] = 100\sqrt{72}$ or 848.53 (5 sf) Total = $400\pi + 128\pi - 144 + 100\sqrt{72}$ = 2363.29 = 2360 cm^2 (3 sf)	B1 M1 M1(√) M1(√) A1
13	$2x + 3y = 49$ $3x + y = 56 \Rightarrow y = 56 - 3x$ Sub $y = 56 - 3x$ into $2x + 3y = 49$ $2x + 3(56 - 3x) = 49$ $2x + 168 - 9x = 49$ $-7x = -119$ $x = 17$ Then, $y = 56 - 3(17) = 5$	B1 – for both equations M1(√) A1 A1
14(a)	$k = 30 - 6 - 8 - 5 = 11$	B1

14(b)		B1 – horizontal axis scale correct, and labelled B1 – all bars correct height
14(c)	A histogram is better than a pie chart because the heights of the histogram represents the frequencies and hence the frequencies can be easily compared at a glance (while the sectors of a pie chart are less easy to compare.)	B1