

the PiXL<sub>club</sub>  
partners in excellence

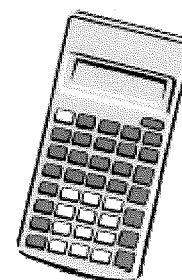
## Practice Paper

### Edexcel Linear Specification

# Higher Tier

March 2013

# Worked Solutions



This paper is produced as a best guess for the non-calculator paper.

We offer this paper as a service, but make no great claims as to its accuracy.

**Time: 1 hour 45 minutes**

**Marks: 100**

### Advice

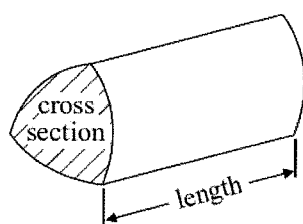
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

# GCSE Mathematics 1MA0

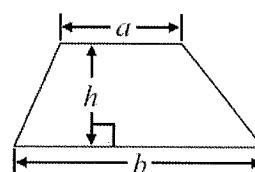
## Formulae: Higher Tier

**You must not write on this formulae page.  
Anything you write on this formulae page will gain NO credit.**

**Volume of prism** = area of cross section  $\times$  length

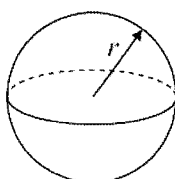


**Area of trapezium** =  $\frac{1}{2} (a + b)h$



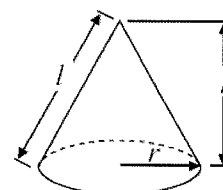
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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

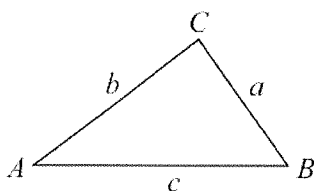


**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

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



**In any triangle ABC**



**The Quadratic Equation**

The solutions of  $ax^2 + bx + c = 0$   
where  $a \neq 0$ , are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Sine Rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

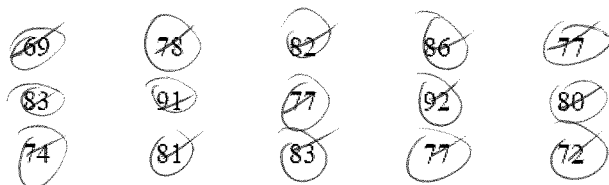
**Cosine Rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** =  $\frac{1}{2} ab \sin C$

## Question 1

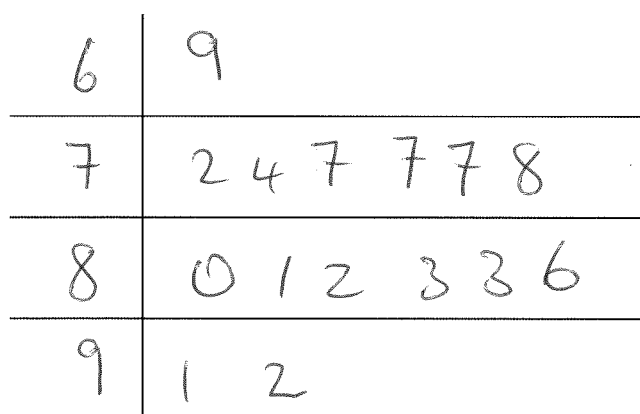
Chris plays golf.

Here are 15 of his scores.



- (a) Draw an ordered stem and leaf diagram to show this information.

You must include a key.



Key:  $6/8 = 68$

(3)

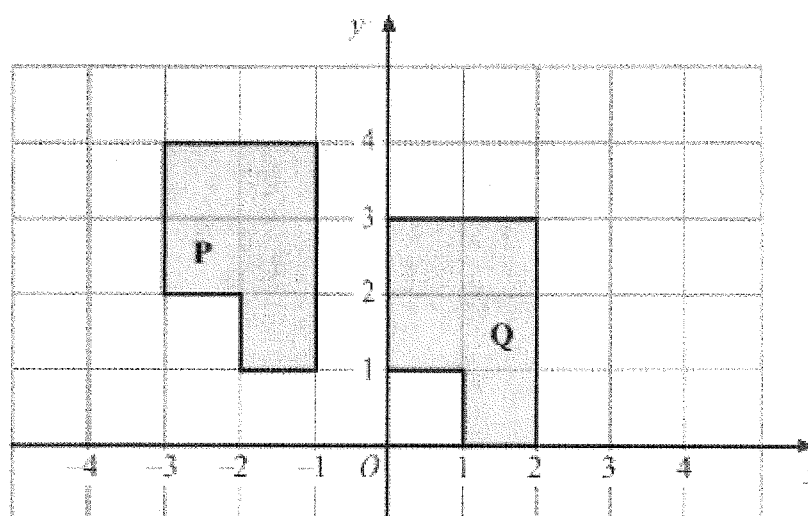
- (b) Write down the mode.

77

(1)

(Total 4 marks)

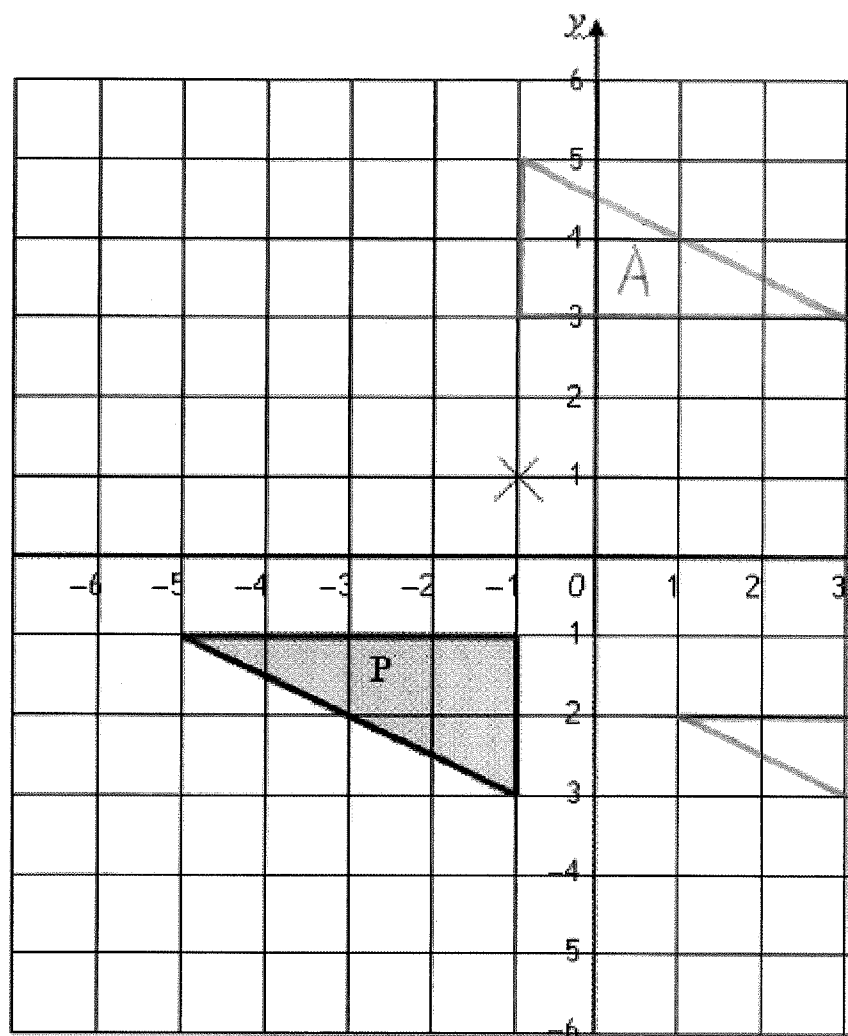
## Question 2



- (b) Describe fully the single transformation that will map shape P onto shape Q.

TRANSLATION of  $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$  (2)

### Question 3



- (a) Rotate triangle **P**  $180^\circ$  about the point  $(-1, 1)$ .

Label the new triangle **A**.

### Question 4

2. Work out  $\frac{4.6 + 3.85}{3.2^2 - 6.51}$

Write down all the numbers on your calculator display.

$$\frac{8.45}{3.73}$$

$$= 2.26541555$$

**(Total 2 marks)**

## Question 5

Here is a list of ingredients to make melon sorbet for 6 people.

| Melon Sorbet<br>for 6 people |              |
|------------------------------|--------------|
| 800 g                        | melon        |
| 4                            | egg whites   |
| $\frac{1}{2}$                | lime         |
| 100 g                        | caster sugar |

Terry makes melon sorbet for 18 people.

- (a) Work out how much caster sugar he uses.

$$100 \times 3$$

$$\dots\dots\dots 300 \dots\dots\dots \text{g}$$

(2)

Hedley makes melon sorbet.  
He uses 2 limes.

- (b) Work out how many people he makes melon sorbet for.

$$4 \times 6$$

$$\dots\dots\dots 24 \text{ people} \dots\dots\dots$$

(2)

(Total 4 marks)

## Question 6

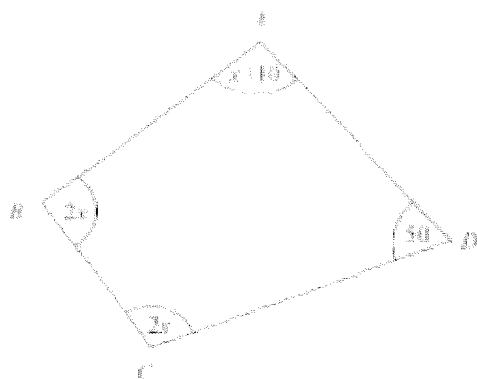


Diagram NOT  
accurately drawn

In this quadrilateral, the sizes of the angles, in degrees, are

- $x + 10$
- $2x$
- $2x$
- $50$

(a) Use this information to write down an equation in terms of  $x$

$$x + 10 + 2x + 2x + 50 = 360$$

(1)

(b) Work out the value of  $x$

$$5x + 60 = 360$$

$$5x = 300$$

$$x = 300/5$$

60

(3)

(Total 5 marks)



### Question 7

A circle has a radius of 5 cm.

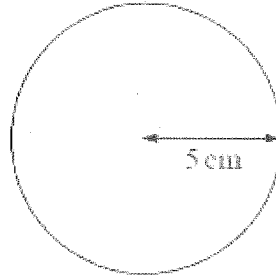


Diagram **NOT**  
accurately drawn

Work out the area of the circle.  
Give your answer correct to 3 significant figures.

$$A = \pi r^2$$

$$= \pi \times 25$$

78.5

..... cm<sup>2</sup>

(Total 2 marks)

### Question 8

A straight line passes through  $(0, -2)$  and  $(3, 10)$ .

Find the equation of the straight line.

$$m = \frac{10 - -2}{3 - 0}$$

$$= 4$$

$$c = -2$$

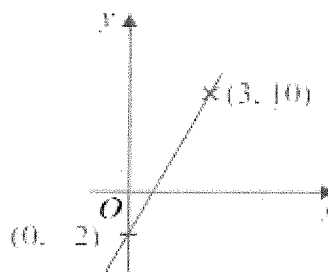


Diagram **NOT**  
accurately drawn

$$y = 4x - 2$$

(Total 3 marks)

## Question 9

Pete and Sue are going to take their children to France.

They will travel together on the same ferry.

They will travel with one of two ferry companies, Easy Ferry or Seawagon.

The tables give information about the costs for each adult and each child to travel with these ferry companies.

| Easy Ferry |  | July   |         |         | August |         |         |
|------------|--|--------|---------|---------|--------|---------|---------|
| Date       |  | 1 – 10 | 11 – 21 | 22 – 31 | 1 – 10 | 11 – 21 | 22 – 31 |
| Adult      |  | £32.00 | £36.50  | £39.50  | £42.25 | £42.25  | £37.75  |
| Child      |  | £18.00 | £20.25  | £23.75  | £25.85 | £25.85  | £21.00  |

| Seawagon |  | July   |         |         | August |         |         |
|----------|--|--------|---------|---------|--------|---------|---------|
| Date     |  | 1 – 10 | 11 – 21 | 22 – 31 | 1 – 10 | 11 – 21 | 22 – 31 |
| Adult    |  | £33.50 | £37.50  | £40.25  | £43.85 | £44.95  | £38.50  |
| Child    |  | £17.25 | £19.75  | £21.85  | £24.65 | £23.95  | £19.95  |

The table below gives information about the discount they will get from each ferry company if they book early.

| Early booking discount |                   |
|------------------------|-------------------|
| Easy Ferry             | $\frac{1}{3}$ off |
| Seawagon               | 25% off           |

Pete and Sue have three children.

They will travel on 25 July.

They will book early.

Pete and Sue will travel with the cheaper ferry company.

Which ferry company?

You must show all your working.

Easy Ferry

$$2 \times 39.50 = 79.00$$

$$3 \times 23.75 = 71.25$$

$$150.25$$

$$\frac{1}{3} \text{ of } 150.25$$

$$= 50.08$$

$$150.25 - 50.08$$

$$£ 100.17$$

Seawagon.

$$\begin{array}{r} 2 \times 40.25 = 80.50 + \\ 3 \times 21.85 = 65.55 \\ \hline 146.05 \end{array}$$

$$25\% \text{ of } 146.05 = 36.51$$

$$\begin{array}{r} 146.05 \\ - 36.51 \\ \hline \pounds 109.54 \end{array}$$

Pete & Sue will choose EASY FERRY

(Total 5 marks)

### Question 10

Ali asked 200 students which sport they like best.  
They could choose swimming or tennis or athletics.

The two-way table shows some information about their answers.

|        | Swimming | Tennis | Athletics | Total |
|--------|----------|--------|-----------|-------|
| Female | 43       | 25     | 19        | 87    |
| Male   | 36       | 42     | 35        | 113   |
| Total  | 79       | 67     | 54        | 200   |

Complete the two-way table.

(Total 3 marks)

## Question 11

Toby invested £4500 for 2 years in a savings account.  
He was paid 4% per annum compound interest.

- (a) How much did Toby have in his savings account after 2 years?

$$4500 \times 1.04^2$$

$$\pounds 4867.20$$

(3)

Jaspir invested £2400 for  $n$  years in a savings account.  
He was paid 7.5% per annum compound interest.

At the end of the  $n$  years he had £3445.51 in the savings account.

- (b) Work out the value of  $n$ .

$$2400 \times 1.075^n$$

$$2400 \times 1.075^4 = 3205.13$$

$$2400 \times 1.075^5 = 3445.51$$

$$n = 5$$

(2)

(Total 5 marks)

## Question 12

(a) Expand and simplify

$$(x - 3)(x + 5)$$

$$x^2 - 3x + 5x - 15$$

$$= x^2 + 2x - 15$$

(2)

(b) Solve

$$\frac{29-x}{4} = x+5$$

$$29-x = 4(x+5)$$

$$= 4x + 20$$

$$9 = 5x$$

$$9/5 = x$$

$$x = 1.8$$

(3)

(Total 5 marks)

### Question 13

The table shows some information about the heights ( $h$  cm) of 100 students.

| Height ( $h$ cm)   | Frequency | $m$ | $m \times h$ |
|--------------------|-----------|-----|--------------|
| $120 \leq h < 130$ | 8         | 125 | 1000         |
| $130 \leq h < 140$ | 16        | 135 | 2160         |
| $140 \leq h < 150$ | 25        | 145 | 3625         |
| $150 \leq h < 160$ | 30        | 155 | 4650         |
| $160 \leq h < 170$ | 21        | 165 | 3465         |

(a) Find the class interval in which the median lies.

$$150 \leq h < 160$$

(1)

(b) Work out an estimate for the mean height of the students.

$$\text{Mean} = \frac{\sum mh}{100}$$

$$= \frac{14900}{100}$$

$$149$$

cm

(1)

(Total 5 marks)



### Question 14

In a sale, normal prices are reduced by 12%.  
The sale price of a digital camera is £132.88

← multiply 0.88

Work out the normal price of the digital camera.

$$\text{Normal Price} = \frac{132.88}{0.88}$$

£ 151

(Total 3 marks)

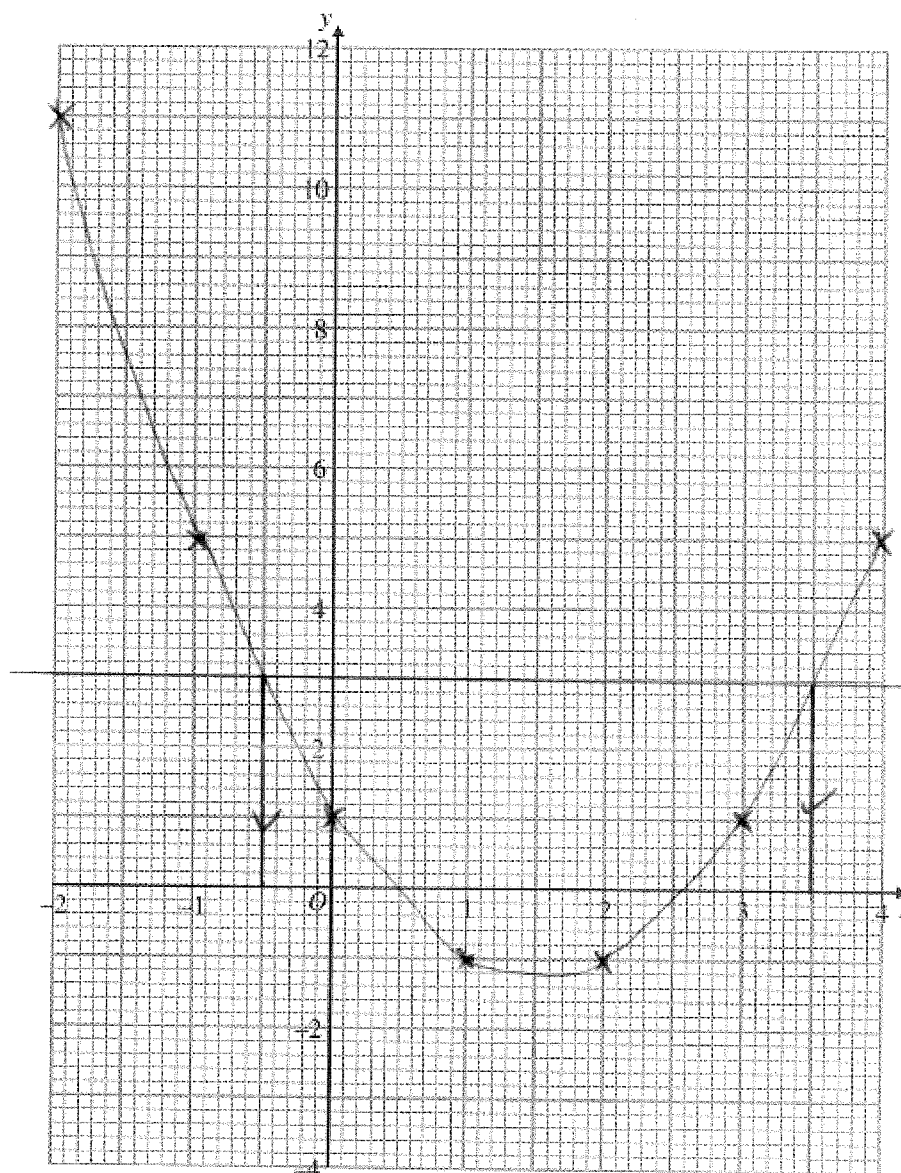
### Question 15

- (a) Complete the table of values for  $y = x^2 - 3x + 1$

|     |    |    |   |    |    |   |   |
|-----|----|----|---|----|----|---|---|
| $x$ | -2 | -1 | 0 | 1  | 2  | 3 | 4 |
| $y$ | 11 | 5  | 1 | -1 | -1 | 1 | 5 |

(2)

- (b) On the grid, draw the graph of  $y = x^2 - 3x + 1$



$y = 3$

(2)

- (c) Use your graph to estimate the values of  $x$  for which  $y = 3$

$x = \dots - 0.5 \dots$

$x = \dots + 3.5 \dots$

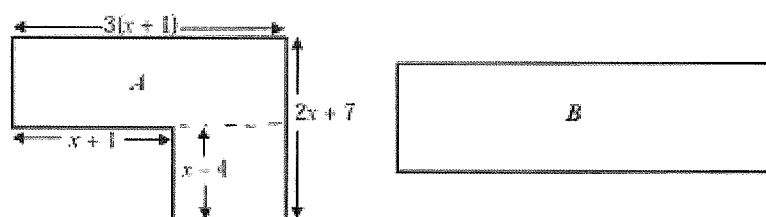
(2)

(Total 6 marks)



## Question 17

Diagrams NOT accurately drawn



The diagram shows two shapes.  
In shape A, all of the angles are right angles.  
Shape B is a rectangle.  
All the measurements are in centimetres.

The area of shape A is equal to the area of shape B.

Find an expression, in terms of  $x$ , for the length and an expression, in terms of  $x$ , for the width of shape B.

Shape A: Top rectangle - Length is  $3x+3$ , width is  $2x+7-(x-4)$   
 $= 2x+7-x+4$   
 $= x+11$

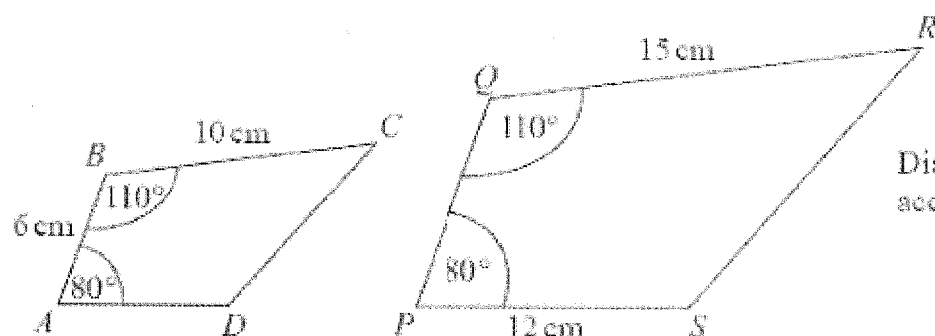
Bottom rectangle - Length is  $3(x+1)-(x+1) = 2(x+1) = 2x+2$   
 width is  $x-4$ .

Area of Shape A =  $(3x+3)(x+11) + (2x+2)(x-4)$   
 $= 3x^2 + 33x + 33x + 33 + 2x^2 + 2x - 8x - 8$   
 $= 5x^2 + 30x + 25$   
 $= 5(x^2 + 6x + 5)$   
 $= 5(x+5)(x+1)$

length of B is  $5(x+5)$ , width is  $x+1$ .

Total 6 marks

# Question 18



$ABCD$  and  $PQRS$  are mathematically similar.

(a) Find the length of  $PQ$ .

S.F. 1.5.

$$PQ = 6 \times 1.5$$

9

..... cm  
(2)

(b) Find the length of  $AD$ .

$$AD = \frac{12}{1.5}$$

8

..... cm  
(2)

(Total 4 marks)

## Question 19

Here is a right-angled triangle.

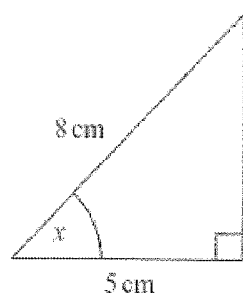


Diagram NOT  
accurately drawn

$$\begin{aligned}\cos x &= \frac{5}{8} \\ x &= \cos^{-1}\left(\frac{5}{8}\right) \\ &= 51.3\end{aligned}$$

- (a) Calculate the size of the angle marked  $x$ .  
Give your answer correct to 1 decimal place.

$$x = 51.3^\circ$$

(3)

Here is another right-angled triangle.

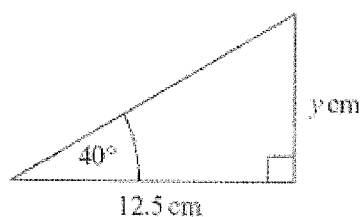


Diagram NOT  
accurately drawn

- (b) Calculate the value of  $y$ .  
Give your answer correct to 1 decimal place.

$$\tan 40 = \frac{y}{12.5}$$

$$\begin{aligned}12.5 \times \tan 40 &= y \\ &= 10.5\end{aligned}$$

$$y = 10.5$$

(3)

(Total 6 marks)

## Question 20

The table below gives some information about some students in a school.

| Year group | Boys | Girls | Total |
|------------|------|-------|-------|
| Year 12    | 126  | 94    | 220   |
| Year 13    | 77   | 85    | 162   |
| Total      | 203  | 179   | 382   |

Andrew is going to carry out a survey of these students.

He uses a sample of 50 students, stratified by year group and gender.

Work out the number of Year 13 girls that should be in his sample.

$$\frac{85}{382} \times 50 = 11.1$$

11

(Total 2 marks)

### Question 21

Solve  $3x^2 + 7x - 13 = 0$

Give your solutions correct to 2 decimal places.

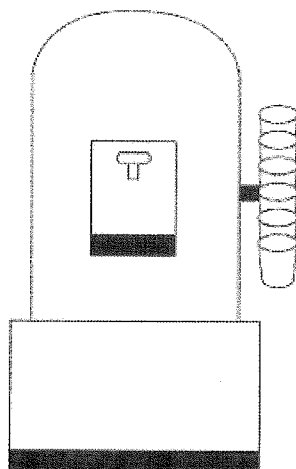
$$\begin{aligned}
 x &= \frac{-B \pm \sqrt{B^2 - 4AC}}{2A} &= \frac{-7 \pm \sqrt{49 + 156}}{6} \\
 & &= \frac{-7 \pm \sqrt{205}}{6} \\
 & &= \frac{-7 \pm 14.31782}{6}
 \end{aligned}$$

$$x = \frac{-3.55}{6} \quad \text{or} \quad x = \frac{1.22}{6}$$

(Total 3 marks)



## Question 22



A water container has 19.5 litres of water in it.  
A cup holds 210 ml of water.

At most 92 cups can be filled completely from the water container.  
Explain why.  
You must show all your working.

$$\begin{array}{rclcl}
 0.210 \times 92 & = & 19.32 & \text{litres} & < 19.5 \\
 0.210 \times 93 & = & 19.53 & \text{litres} & > 19.5
 \end{array}$$

Here you don't have enough to fill 93 cups,  
but you can fill 92

(Total 3 marks)

### Question 23

Max and Lili have 9 bottles of juice in their fridge.

They have

- 4 bottles of orange juice
- 3 bottles of cranberry juice
- 2 bottles of mango juice

They each take a bottle, at random, from the fridge.

What is the probability that they each take a bottle of the same type of juice?

$$p(O, O) = \frac{4}{9} \times \frac{3}{8} = \frac{12}{72}$$

$$p(C, C) = \frac{3}{9} \times \frac{2}{8} = \frac{6}{72}$$

$$p(M, M) = \frac{2}{9} \times \frac{1}{8} = \frac{2}{72}$$

$$p(\text{both bottles the same})$$

$$= \frac{12}{72} + \frac{6}{72} + \frac{2}{72} = \frac{20}{72}$$

$$\frac{20}{72}$$

(Total for Question 16 is 4 marks)

## Question 24

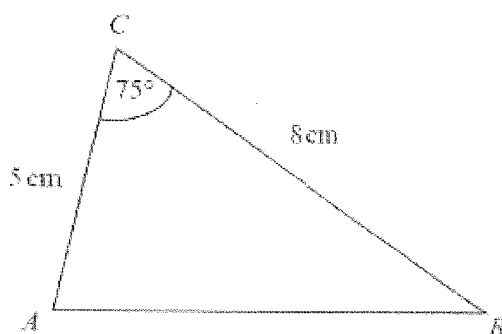


Diagram NOT  
accurately drawn

In triangle  $ABC$ ,

$$AC = 5 \text{ cm.}$$

$$BC = 8 \text{ cm.}$$

$$\text{Angle } ACB = 75^\circ.$$

(a) Calculate the area of triangle  $ABC$ .

Give your answer correct to 3 significant figures.

$$\begin{aligned} \text{Area} &= \frac{1}{2} ab \sin C \\ &= \frac{1}{2} \times 5 \times 8 \times \sin 75 \\ &= \end{aligned}$$

$$\begin{array}{r} 19.3 \\ \hline \end{array} \text{ cm}^2$$

(2)

(b) Calculate the length of  $AB$ .

Give your answer correct to 3 significant figures.

$$\begin{aligned} AB^2 &= 5^2 + 8^2 - 2 \times 5 \times 8 \times \cos 75 \\ &= 89 - 80 \cos 75 \\ &= 68.29 \\ AB &= 8.26 \end{aligned}$$

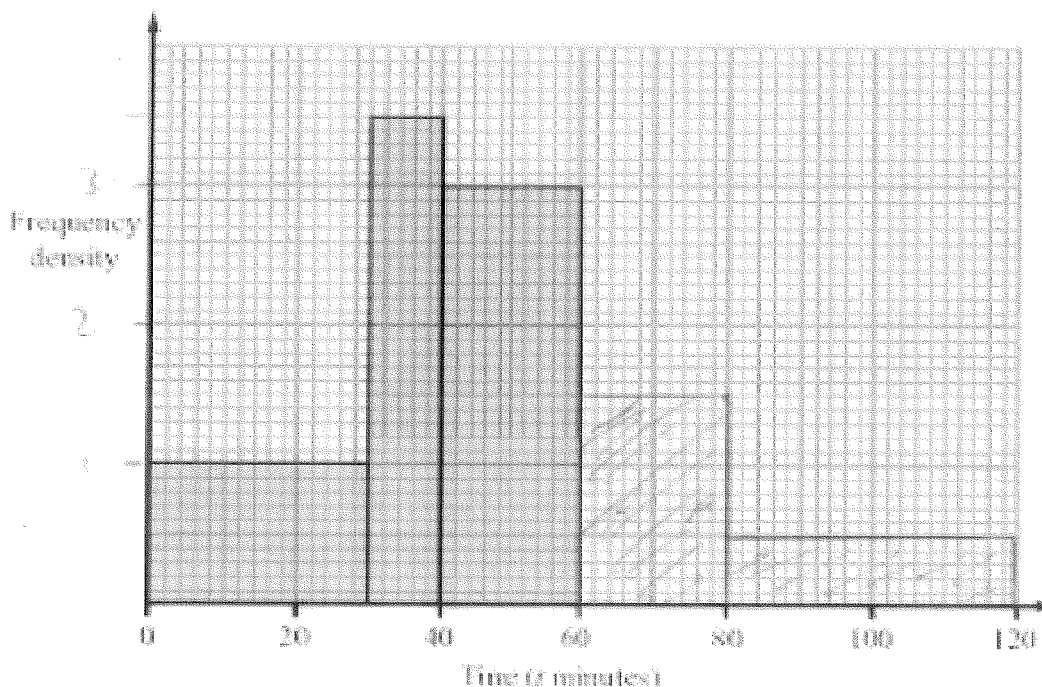
$$\begin{array}{r} 8.26 \\ \hline \end{array} \text{ cm}$$

(3)

(Total 5 marks)

## Question 25

The incomplete histogram and table give some information about the times, in minutes, that cars were parked in a car park.



(a) Use the information in the histogram to complete the frequency table

| Time ( $t$ minutes) | Frequency |
|---------------------|-----------|
| $0 \leq t < 30$     | 30        |
| $30 \leq t < 40$    | 35        |
| $40 \leq t < 60$    | 60        |
| $60 \leq t < 80$    | 50        |
| $80 \leq t < 120$   | 20        |

(2)

(b) Use the information in the table to complete the histogram.

(2)

(Total 4 marks)

# Question 26

Solve the simultaneous equations

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

$$4x - 3y = 11$$

$$12x + 4y = -6$$

$$12x - 9y = 33$$

---


$$+ 13y = -39$$

$$y = -3$$

$$6x - 6 = -3$$

$$6x = +3$$

$$x = +\frac{1}{2}$$

$$x = \frac{1}{2}, y = -3$$

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(Total 4 marks)

This is the End of the paper