

1MA0/3H

Edexcel GCSE

Mathematics (Linear) – 1MA0

Practice Paper 3H (Non-Calculator)

Set A



Higher Tier

Time: 1 hour 45 minutes

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers

Nil

Instructions

Use black ink or ball-point pen.

Fill in the boxes at the top of this page with your name, centre number and candidate number.

Answer all questions.

Answer the questions in the spaces provided – there may be more space than you need.

Calculators must not be used.

Information

The total mark for this paper is 100.

The marks for each question are shown in brackets – use this as a guide as to how much time to spend on **each** question.

Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

Advice

Read each question carefully before you start to answer it.

Keep an eye on the time.

Try to answer every question.

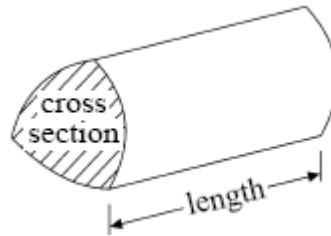
Check your answers if you have time at the end.

GCSE Mathematics (Linear) 1MA0

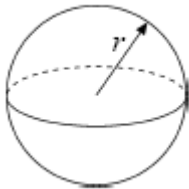
Formulae: Higher Tier

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

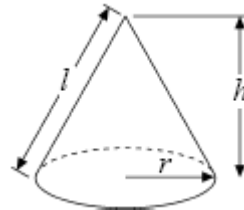
Volume of prism = area of cross section \times length



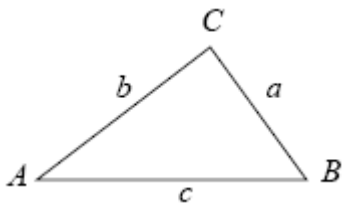
Volume of sphere $\frac{4}{3}\pi r^3$
Surface area of sphere = $4\pi r^2$



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 = $\frac{1}{2} ab \sin C$

Answer ALL TWENTY SEVEN questions

Write your answers in the spaces provided.

You must write down all the stages in your working.

You must NOT use a calculator.

1. Simplify $5a + 4b - 2a + 3b$

.....
(Total 2 marks)

2. Using the information that

$$9.7 \times 12.3 = 119.31$$

write down the value of

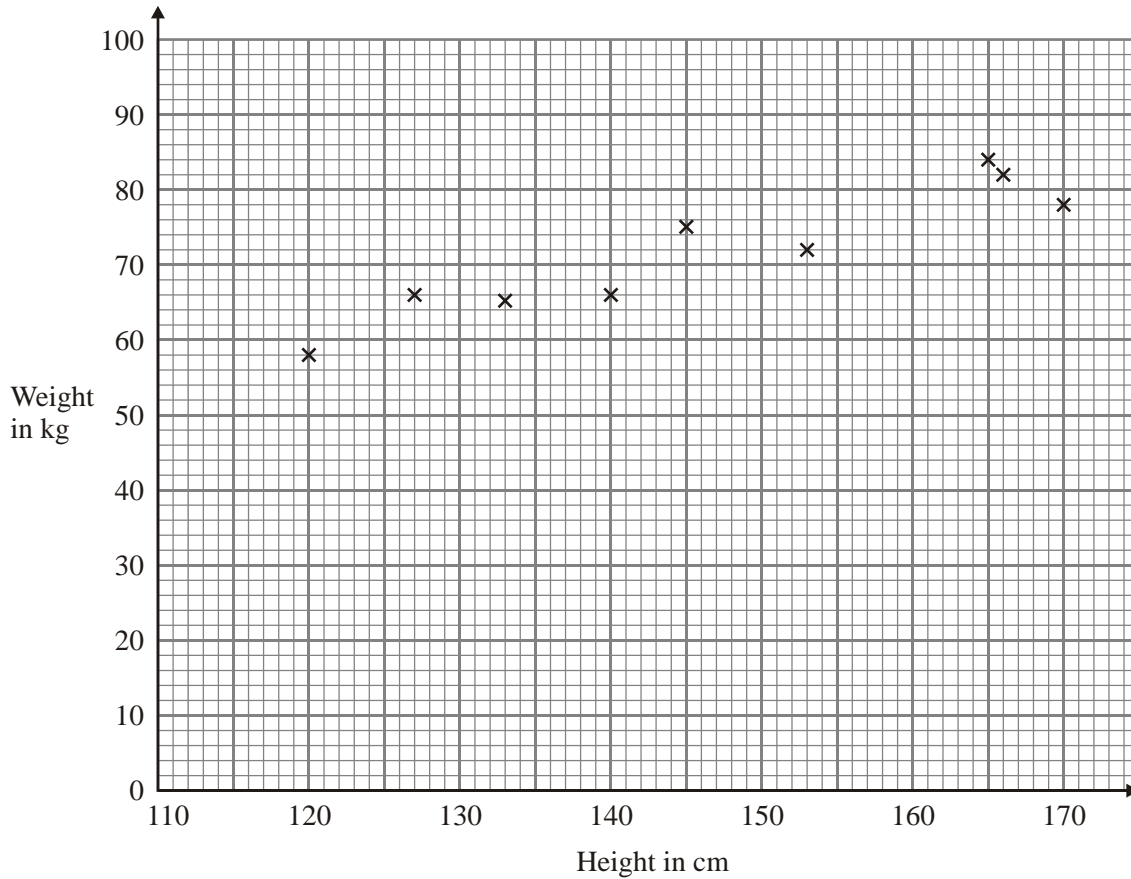
$$97 \times 123$$

$$0.97 \times 123\,000$$

$$11\,931 \div 97$$

.....
.....
.....
.....
(Total 3 marks)

3. The scatter graph shows information about the height and the weight for nine students.



The table shows the height and the weight for three more students.

| | | | |
|--------------|-----|-----|-----|
| Height in cm | 135 | 155 | 170 |
| Weight in kg | 70 | 75 | 85 |

(a) On the scatter graph, plot the information from the table.

(1)

(b) What type of correlation does this scatter graph show?

.....

(1)

(c) The weight of another student is 80 kg.

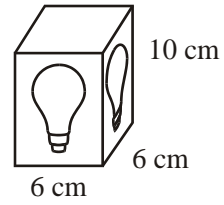
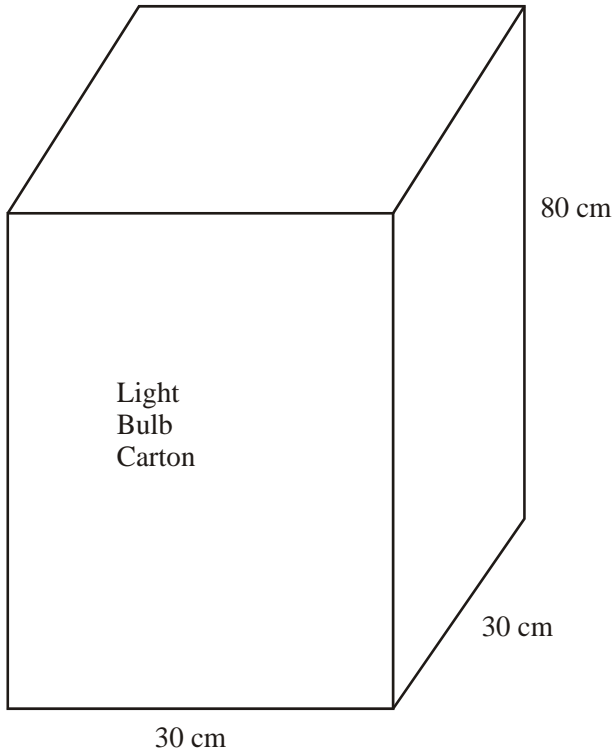
Estimate the height of this student.

.....cm

(2)

(Total 4 marks)

4.



Diagrams **NOT**
accurately drawn

A light bulb box measures 6 cm by 6 cm by 10 cm.

Light bulb boxes are packed into cartons.

A carton measures 30 cm by 30 cm by 80 cm.

Work out the number of light bulb boxes which can completely fill one carton.

.....
(Total 3 marks)

*5. The manager of a department store has made some changes.

She wants to find out what people think of these changes.

She uses this question on a questionnaire.

“What do you think of the changes in the store?”

Excellent

Very good

Good

(a) Write down what is wrong about this question.

.....
.....
.....

(1)

This is another question on the questionnaire.

“How much money do you normally spend in the store?”

A lot

Not much

(b) Write down one thing that is wrong with this question.

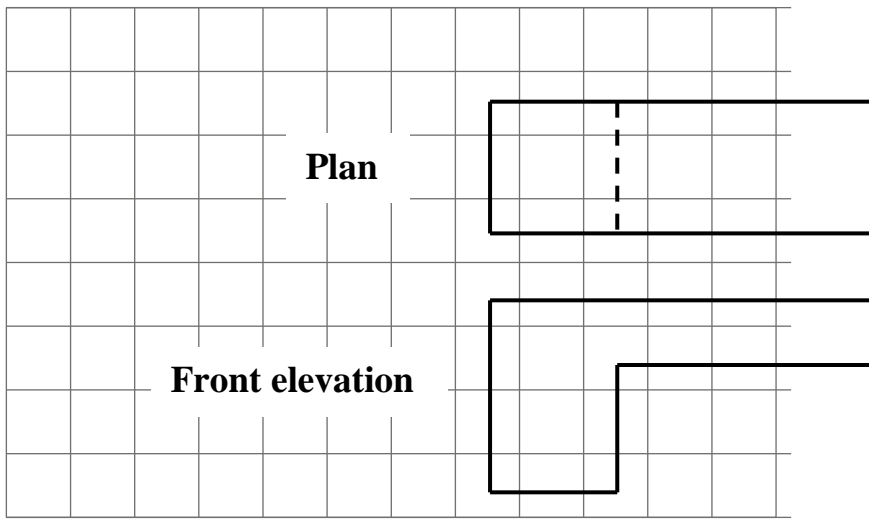
.....
.....
.....

(1)

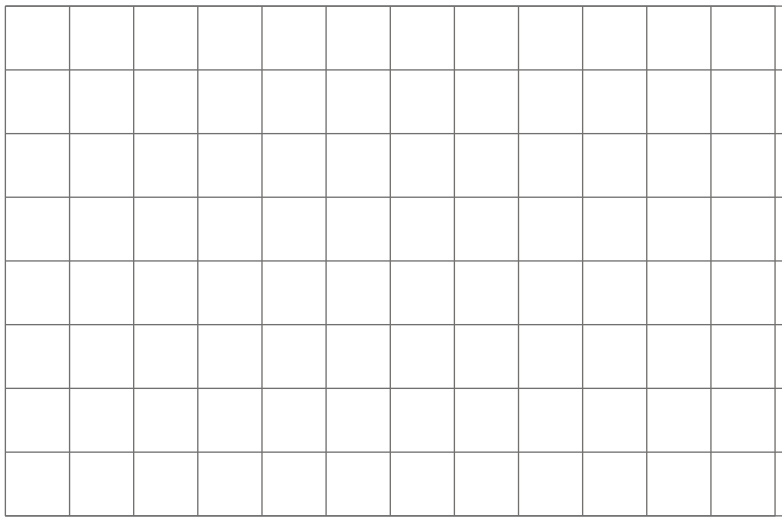
(Total 2 marks)

6. Here are the plan and front elevation of a prism.

The front elevation shows the cross section of the prism.



(a) On the grid below, draw a side elevation of the prism.



(2)

(b) In the space below, draw a 3-D sketch of the prism.

(2)

(Total 4 marks)

7.

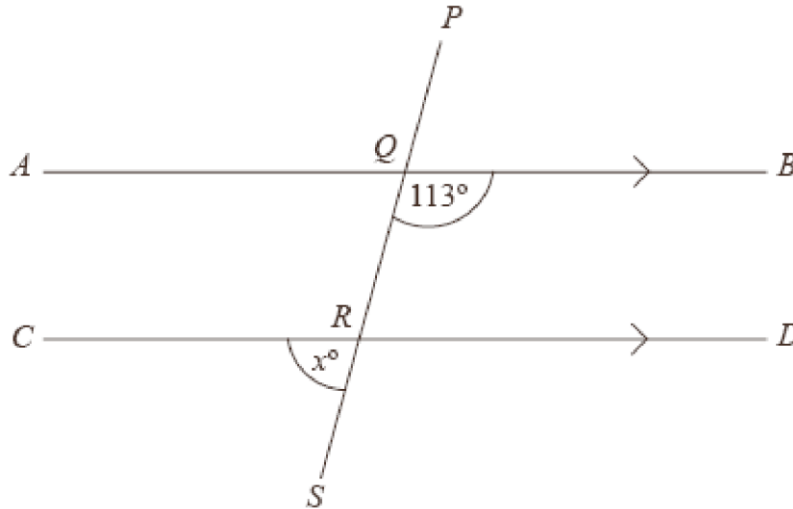


Diagram **NOT** accurately drawn

AQB , CRD and $PQRS$ are straight lines.

AB is parallel to CD .

Angle $BQR = 113^\circ$.

(a) Work out the value of x .

$x = \dots\dots\dots$

(b) Give reasons for your answer.

.....
.....
.....

(Total 4 marks)

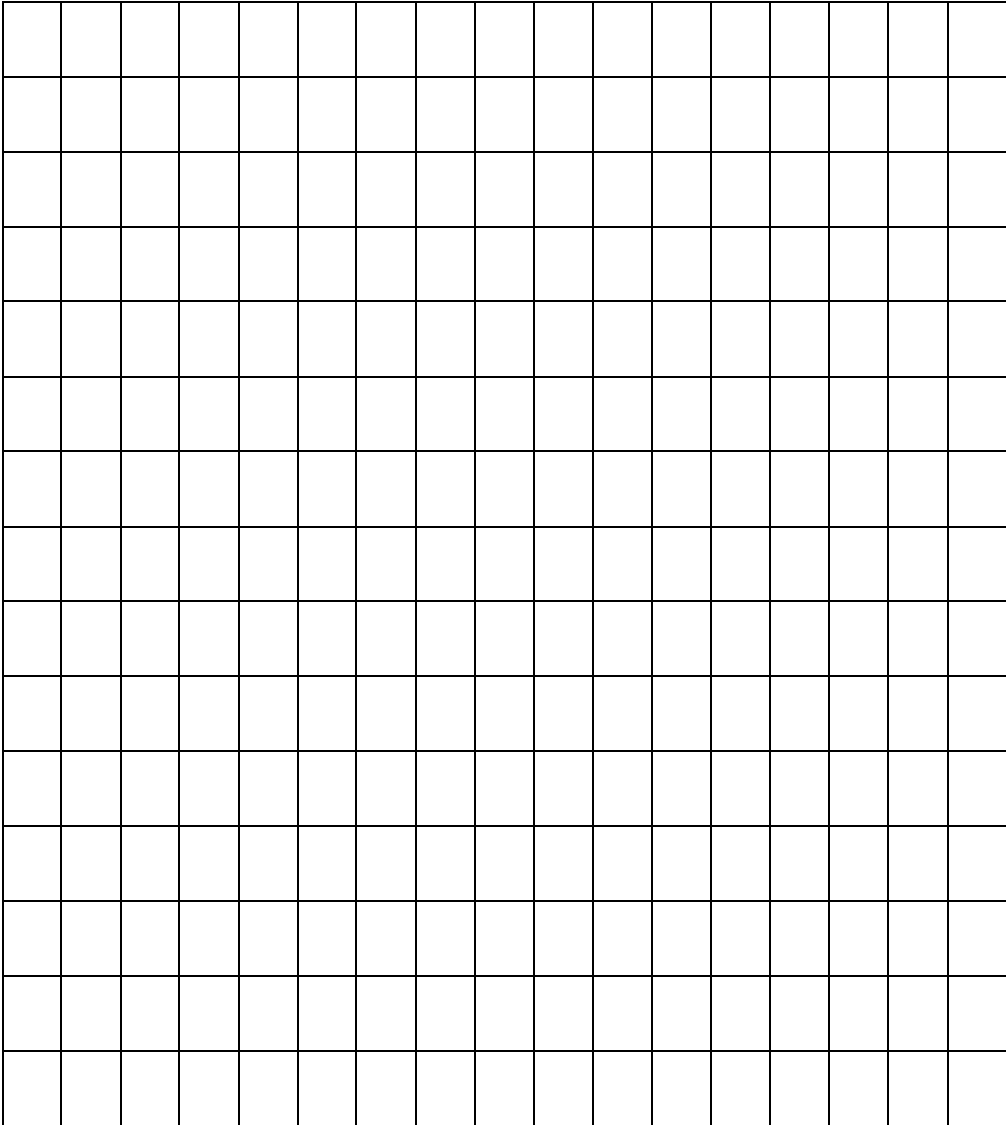
8. Some students did a French test and a German test.

Here are their results.

| | | | | | |
|---------------------|----|----|----|----|----|
| French test results | 44 | 28 | 39 | 50 | 14 |
| | 20 | 32 | 34 | 20 | 45 |

| | | | | | |
|---------------------|----|----|----|----|----|
| German test results | 50 | 25 | 38 | 36 | 31 |
| | 22 | 54 | 45 | 51 | 48 |

On the grid, draw diagrams that could be used to compare the French test results with the German test results.



(3)

***(b)** Make one comparison between the French test results and the German test results.

.....
.....
.....

(1)

(Total 4 marks)

***9.** Samantha wants to buy a new pair of trainers.

There are 3 shops that sell the trainers she wants.

| |
|----------------------------|
| Sports '4' All Trainers |
| £5 |
| plus |
| 12 payments of |
| £4.50 |

| |
|----------------------------|
| Edexcel Sports Trainers |
| $\frac{1}{5}$ off |
| usual price of |
| £70 |

| |
|---------------------------|
| Keef's Sports Trainers |
| £50 |
| plus |
| VAT at 20% |

From which shop should Samantha buy her trainers to get the best deal?
You must show all of your working.

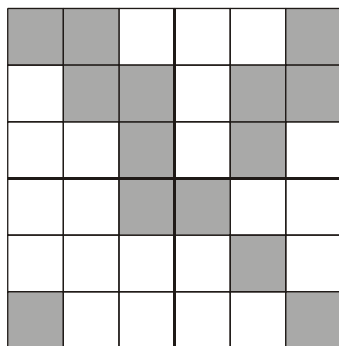
(Total 5 marks)

10. A pattern is to be drawn.

It will have rotational symmetry of order 4.

The pattern has been started.

By shading six more squares, complete the pattern.



(Total 3 marks)

11. Stuart and Helen play a game with red and blue cards.

Red cards are worth 4 points each.

Blue cards are worth 1 point each.

Stuart has r red cards and b blue cards.

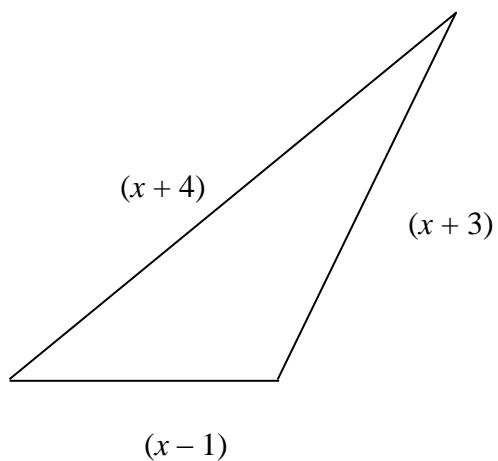
Helen has 2 red cards and twice as many blue cards as Stuart.

The total number of points of Stuart and Helen's cards is T .

Write down, in terms of r and b , a formula for T

.....
(Total 4 marks)

12. The perimeter of a triangle is 19 cm
All the lengths on the diagram are in centimetres.



Work out the value of x .

$x = \dots\dots\dots$

(Total 3 marks)

13. The table gives information about an estate agent's charges for selling a house.

| Value of the house | Estate agent's charges |
|--------------------|---|
| Up to £60 000 | 2% of the value of the house |
| Over £60 000 | 2% of the first £60 000 plus 1% of the remaining value of the house |

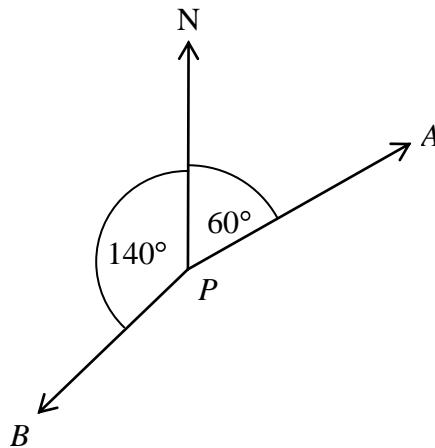
Ken uses this estate agent to sell his house.
The estate agent sold Ken's house for £80 000.

Work out the total charge that Ken will have to pay.

£.....

(Total 4 marks)

14.



(a) Write down the bearing of *A* from *P*.

.....°

(b) Work out the bearing of *B* from *P*.

.....°

(Total 3 marks)

15. (a) Work out $\frac{2}{5} + \frac{3}{10}$

.....
(2)

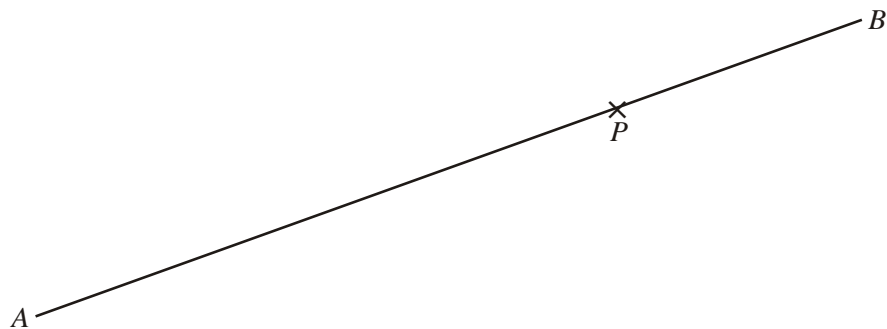
(b) Work out $5\frac{2}{3} - 2\frac{1}{4}$

.....
(3)

(Total 5 marks)

16. Use the ruler and compasses to construct the perpendicular to the line segment AB that passes through the point P .

You must show all construction lines.



(Total 2 marks)

17. 80 people work in Jenny's factory.
The table shows some information about the annual pay of these 80 workers.

| Annual pay (£ x) | Number of workers |
|----------------------------|-------------------|
| $10\,000 < x \leq 14\,000$ | 32 |
| $14\,000 < x \leq 16\,000$ | 24 |
| $16\,000 < x \leq 18\,000$ | 16 |
| $18\,000 < x \leq 20\,000$ | 6 |
| $20\,000 < x \leq 40\,000$ | 2 |

- (a) Write down the modal class interval.

.....
(1)

- (b) Find the class interval that contains the median.

.....
(1)

(Total 2 marks)

18. The point A has coordinates $(-5, 1)$.

The point B has coordinates $(7, y)$.

The point $(x, 6)$ is the midpoint of the line segment AB .

Find the value of x and the value of y .

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total 2 marks)

19. (a) Factorise $5x - 10$

.....
(1)

(b) Factorise fully $2p^2 - 4pq$

.....
(2)

(c) Expand and simplify $(t + 5)(t - 4)$

.....
(2)

(d) Write down the integer values of x that satisfy the inequality

$$-2 \leq x < 3$$

.....
(2)

(Total 7 marks)

20. In Holborn High School there are exactly twice as many girls as boys.

$\frac{3}{5}$ of the boys like sport.

$\frac{1}{10}$ of the girls like sport.

What fraction of the total number of students in the school like sport?

.....
(Total 4 marks)

21. Solve

$$2x - 3y = 11$$

$$5x + 2y = 18$$

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

(Total 4 marks)

22. The Hawshaw Summer Fete is running a competition.

You buy a scratch card with 9 squares covered up.
Under the 9 squares on each card, randomly placed
are 4 stars, 3 hearts and 2 LOSE.

Each scratch card costs £1

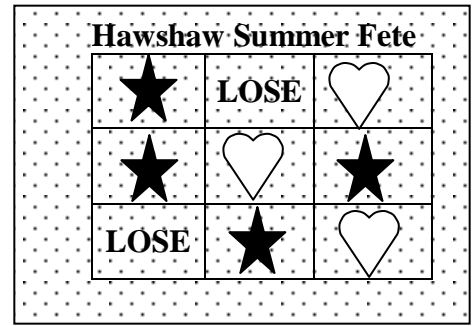
You scratch off two squares.

You win £1.50 if 2 stars are revealed.

You win £2 if 2 hearts are revealed.

Michelle buys a scratch card.

Work out the probability that this will be a winning scratch card.



.....
(3)

There are 1440 tickets sold at the Fete.
All of the proceeds go to charity.

Estimate the amount of money raised for charity

£

(4)
(Total 7 marks)

23.

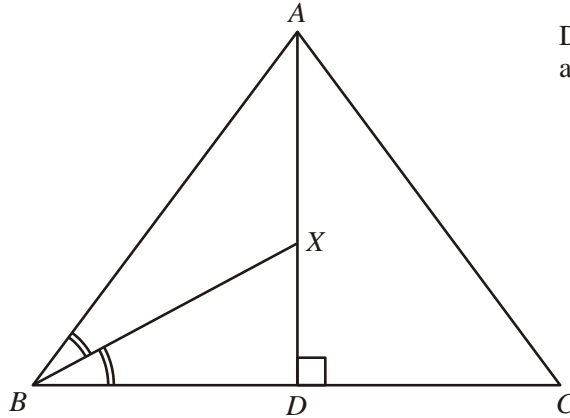


Diagram **NOT**
accurately drawn

ABC is an equilateral triangle.

AD is the perpendicular bisector of BC .

BX is the angle bisector of angle ABC .

Show that triangle BXD is similar to triangle ACD

(2)

In triangle ACD ,

$AC = 2$ cm,

(b) Show that $XD = \frac{1}{\sqrt{3}}$ cm.

(3)

(Total 5 marks)

24. Simplify $\frac{x^2 - 9}{2x^2 - 3x - 9}$

.....
(Total 3 marks)

25. A rectangle has a length of $2t$ cm and a width of $(\sqrt{8} - \sqrt{2})$ cm.
The area of the rectangle is 64 cm^2 .

Work out the value of t .

$t = \dots\dots\dots$
(Total 5 marks)

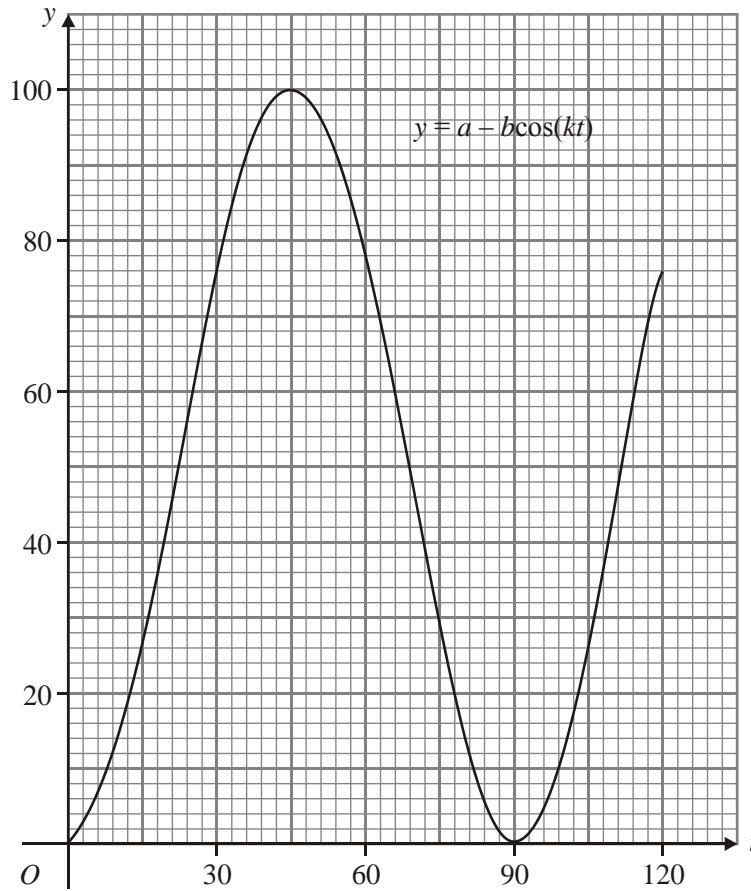
- 26.** Daniel has 2 bags of sweets.
One bag contains 3 green sweets and 4 red sweets.
The other bag contains 1 green sweet and 3 yellow sweets.

Daniel takes one sweet at random from each bag.

Work out the probability that Daniel will take 2 green sweets.

.....
(Total 3 marks)

27.



The graph of $y = a - b \cos(kt)$, for values of t between 0° and 120° , is drawn on the grid.

Use the graph to find an estimate for the value of

(i) a ,

.....

(ii) b ,

.....

(iii) k .


.....

(Total 3 marks)

TOTAL FOR PAPER: 100 MARKS

END

| Question | Working | Answer | Mark | Notes |
|------------------------|---|--|-------------|---|
| 1 | | $3a + 7b$ | 2 | B2 for $3a + 7b$ oe (B1 for $3a$ or $7b$ oe) |
| 2 (i) (ii) (iii) | | 11931 11931 123 | 3 | B1 cao B1 cao B1 cao |
| 3(a) 3(b) 3(c) | | Points plotted Positive 155 - 165 | 1 1 2 | B1 for correct points plotted ± 0.5 square B1 for positive correlation B2 for an answer in the range 155 – 165 (B1 for a line of best fit drawn if answer outside the range) |
| 4 | $30 \times 30 \times 80 \div 6 \times 6 \times 10$ $72000 \div 360$ Or $30 \div 6 \times 30 \div 6 \times 80 \div 10$ $5 \times 5 \times 8$ | 200 | 3 | M1 for $30 \times 30 \times 80 \div 6 \times 6 \times 10$ Or $30 \div 6 \times 30 \div 6 \times 80 \div 10$ M1 for $72000 \div 360$ Or $5 \times 5 \times 8$ A1 cao |
| *5(a) *5(b) | | Response boxes too vague No time period or vague response boxes | 1 1 | C1 for a valid explanation C1 for a valid explanation |

| Question | Working | Answer | Mark | Notes |
|----------|---|---|------|---|
| 6(a) | |  | 2 | B2 cao (B1 for a 2x3 rectangle only) |
| 6(b) | | | 2 | B2 for an accurate 3D sketch (B1 for a 3D sketch with an ‘L’- shaped cross section) |
| 7 (i) | 180 – 113 | 67 | 4 | M1 for 180 – 113 A1 cao |
| (ii) | | corresponding (alternate) angles angles on a straight line sum to 180° | | B1 for corresponding (alternate) angles B1 for angles on a straight line sum to 180° |
| 8(a) | | Diagrams drawn, bar charts, pie charts, frequency polygon, stem & leaf | 3 | B3 for fully labeled comparative diagrams (Deduct one mark for each omission or error type) |
| 8(b) | | German marks higher than French marks, for example | 1 | B1 for any correct comparison made |
| 9 | Sports 4 all: $5 + 4.5 \times 12 = \text{£}59$ Edexcel: $70 \times 4/5 = \text{£}56$ Keef's: $50 \times 1.2 = \text{£}60$ | Edexcel Sports gives the best deal since $\text{£}56$ is the least cost | 5 | M1 for $5 + 4.5 \times 12$ M1 for $70 \times 4/5$ M1 for 50×1.2 A1 for fully correct arithmetic C1 ft for Edexcel Sports supported by ‘correct’ prices |

| Question | Working | Answer | Mark | Notes |
|----------------|--|--------------------|------|---|
| 10 | | 42 cm ³ | 3 | B3 for fully correct diagram (B2 for 4 out of 6 squares correctly placed, B1 for 2 out of 6 squares correctly placed) |
| 11 | Stuart: $r \times 4 + b \times 1 = 4r + b$ Helen: $2 \times 4 + 2b \times 1 = 8 + 2b$ | $4r + 3b + 8$ | 4 | M1 for $r \times 4 + b \times 1 (= 4r + b)$ B1 for $2b$ for Helen's blue cards M1 for $2 \times 4 + 2b \times 1 (= 8 + 2b)$ A1 cao |
| 12 | $x + 4 + x + 3 + x - 1 = 3x + 6$ $3x + 6 = 19$ $3x = 13$ | 13/3 oe | 3 | M1 for $x + 4 + x + 3 + x - 1 (= 3x + 6)$ M1 for $3x + 6 = 19$ A1 for 13/3 oe |
| 13 | $60000 \times 2/100 = 1200$ $(80000 - 60000) \times 1/100 = 200$ $1200 + 200$ | 1400 | 4 | M1 for $60000 \times 2/100 (= 1200)$ M1 for $80000 - 60000$ M1 for ' $80000 - 60000$ ' $\times 1/100 (= 200)$ A1 cao |
| 14 (i) (ii) | 360 - 140 | 060 220 | 3 | B1 cao M1 for $360 - 140$ A1 cao |
| 15(a) | $\frac{2}{5} + \frac{3}{10} = \frac{4}{10} + \frac{3}{10}$ | $\frac{7}{10}$ | 2 | M1 for changing to a common denominator with at least one correct numerator A1 cao |
| 15(b) | $5 - 2 = 3$ $\frac{2}{3} - \frac{1}{4} = \frac{8}{12} - \frac{3}{12} = \frac{5}{12}$ | $\frac{5}{312}$ | 3 | M1 for $5 - 2 = 3$ M1 for $\frac{1}{4} = \frac{8}{12} - \frac{3}{12} = \frac{5}{12}$ A1 for $\frac{5}{312}$ oe |

| Question | Working | Answer | Mark | Notes |
|----------------|---|--|------|--|
| 16 | | perpendicular | 2 | B2 for a correct perpendicular constructed with accurate intersecting arcs. (B1 for a perpendicular drawn) |
| 17(a) 17(b) | | $10000 < x \leq 14000$ $14000 < x \leq 16000$ | 1 | B1 cao B1 cao |
| 18 | $x = (-5 + 7)/2$ $6 = (1 + y)/2$ | 1, 11 | 2 | M1 for either $x = (-5 + 7)/2$ or $6 = (1 + y)/2$ A1 for $x = 1$ and $y = 11$ [B1 for either $x = 1$ or $y = 11$ if M0 scored] |
| 19(a) | | $5(x - 2)$ | 1 | B1 cao |
| 19(b) | | $2p(p - 2q)$ | 2 | B2 cao (B1 for correct partial factorization) |
| 19(c) | $t^2 + 5t - 4t - 20$ | $t^2 + t - 20$ | 2 | M1 for 3 out of 4 correct terms or 4 terms with incorrect signs only |
| 19(d) | | -2, -1, 0, 1, 2 | 2 | B2 for all 5 correct integers and no extras (-1 for each error or omission up to a maximum of -2) |
| 20 | N boys 2N girls $3N/5 + 2N/10 = 4N/5$ $4N/5 \div 3N$ | 4/15 | 4 | M1 for $3N/5$ or $2N/10$ oe M1 for $3N/5 + 2N/10$ oe M1 for ' $4N/5$ ' $\div 3N$ A1 for $4/15$ oe |

| Question | Working | Answer | Mark | Notes |
|----------|--|-----------------|------|--|
| 21 | $4x - 6y = 22$ $15x + 6y = 74$ $19x = 96$ $2 \times 4 - 3y = 11$ | $x = 4, y = -1$ | 4 | M1 for a correct process to eliminate either x or y (condone one arithmetic error) A1 for either $x = 4$ or $y = -1$ M1 (dep on 1 st M1) for correct substitution of their found variable A1 for both $x = 4$ and $y = -1$ |
| 22(a) | Stars: $4/9 \times 3/8 = 12/72$ Hearts: $3/9 \times 2/8 = 6/72$ $12/72 + 6/72 = 18/72$ | $1/4$ | 3 | M1 for $4/9 \times 3/8 (= 12/72)$ or $3/9 \times 2/8 (= 6/72)$ M1 for '12/72' + '6/72' A1 for $1/4$ oe |
| 22(b) | $1440 \times 12/72 \times 1.50 = 360$ $1440 \times 6/72 \times 2 = 240$ $1440 - 360 - 240$ | 840 | 4 | M1 for $1440 \times 12/72$ or $1440 \times 6/72$ M1 for $1440 \times 12/72 \times 1.50 (= 360)$ or $1440 \times 6/72 \times 2 (= 240)$ M1 for $1440 - '360' - '240'$ A1 cao |
| 23(a) | Angle $XBD = 60/2 = 30$ Angle $DAC = 90 - 60 = 30$ | Proof | 2 | B1 for all correct angles of 30, 60 and 90 shown B1 for 'triangles BXD and ACD have identical corresponding angles, both being 30, 60, 90 degree triangles' for example |
| 23(b) | $AD = \sqrt{2^2 - 1^2} = \sqrt{3}$ $XD/CD = BD/AD$ $XD/1 = 1/\sqrt{3}$ | Proof | 3 | M1 for $AD = \sqrt{2^2 - 1^2} (= \sqrt{3})$ M1 for $XD/CD = BD/AD$ oe A1 for completing the proof |

| Question | Working | Answer | Mark | Notes |
|-------------------------|--|--------------------|------|--|
| 24 | $\frac{(x-3)(x+3)}{(2x+3)(x-3)}$ | $\frac{x+3}{2x+3}$ | 3 | M1 for $(x-3)(x+3)$ M1 for $(2x+3)(x-3)$ A1 cao |
| 25 | $2^t(\sqrt{8} - \sqrt{2}) = 64 = 2^6$ $2^t(2\sqrt{2} - \sqrt{2}) = 2^6$ $2^t \times \sqrt{2} = 2^6$ $2^t \times 2^{1/2} = 2^6$ $t + 1/2 = 6$ | $5\frac{1}{2}$ | 5 | M1 for $2^t(\sqrt{8} - \sqrt{2}) = 64$ M1 for $2^t(2\sqrt{2} - \sqrt{2}) = 64$ M1 for $2^t \times 2^{1/2} = 2^6$ M1 for $t + 1/2 = 6$ A1 cao |
| 26 | 3G, 4R 1G, 3Y $\frac{3}{7} \times \frac{1}{4}$ | $\frac{3}{28}$ | 3 | M1 for $\frac{3}{7}$ or $\frac{1}{4}$ M1 for $\frac{3}{7} \times \frac{1}{4}$ A1 for $\frac{3}{28}$ oe |
| 27 (i) (ii) (iii) | | 100 100 4 | 3 | B1 cao B1 cao B1 cao |

