GCSE Mathematics
2019 Predicted Paper 1b (Non-Calculator) 1MA1
Higher Tier (1hr 40mins)

Remember: *These questions are just a guide. There are no guarantees that these questions/topics will come up! So, revise all you can before the calculator exams!*

Instructions

- Use **black** ink or ball-point pen.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*

- You must show all your working
- **Calculators may be used**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated

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*.

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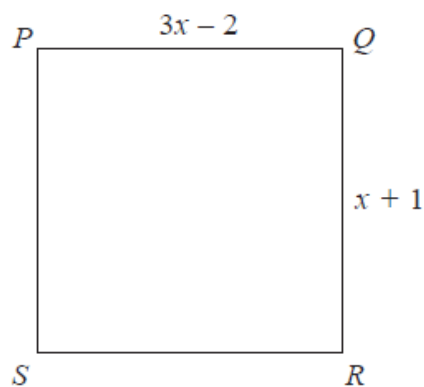- Check your answers if you have time at the end.

1. Use ruler and compasses to construct the bisector of angle *ABC*.

You must show all your construction lines.
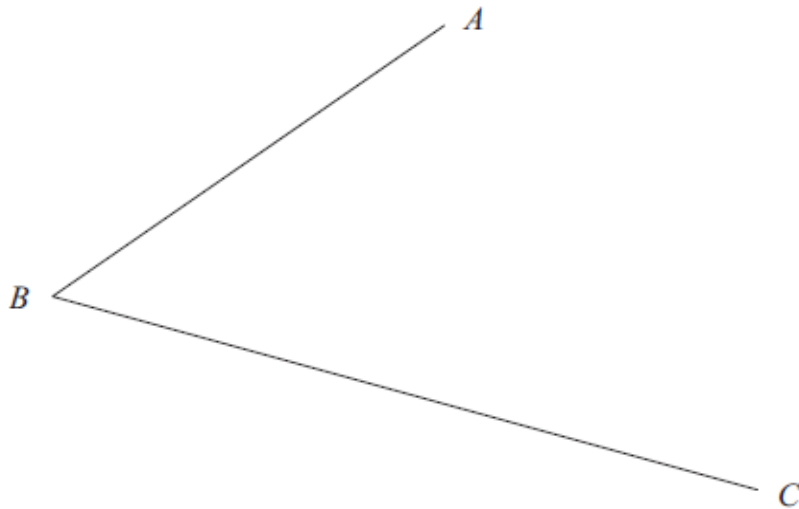
(Total 2 marks)

2. *PQRS* is a square.

All measurements are in centimetres.

Show that the perimeter of the square is 10 cm.

(Total 4 marks)
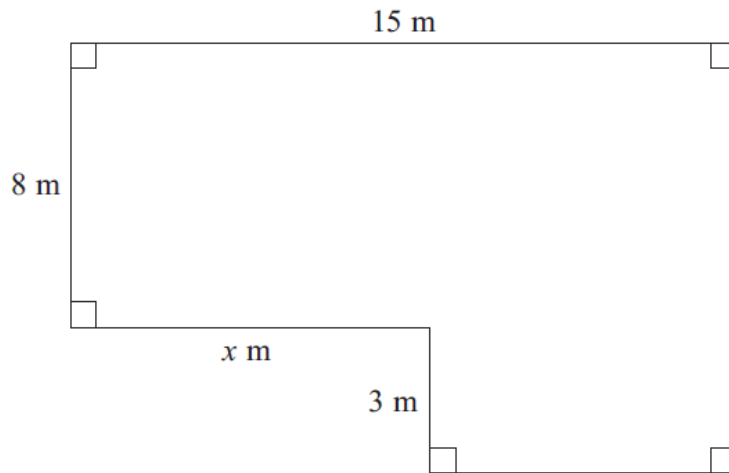
3. The diagram shows the plan of a floor.

15 m

8 m

Diagram **NOT** accurately drawn

x m

3 m

The area of the floor is 138 m².

Work out the value of *x*.

(Total 4 marks)

4. (a) Write down the value of $9^{\frac{1}{2}}$

....(1)

(b) Write down the value of $8^{-\frac{1}{3}}$

....(1)

$2^k = 16$

(c) Write down the value of *k*.

....(1)

(d) Solve $8^5 = 2^{2m+3}$

....(3)

(Total 6 marks)

5. Ann and Bob shared £240 in the ratio 3 : 5

Ann gave a **half** of her share to Colin.

Bob gave a **tenth** of his share to Colin.

What fraction of the £240 did Colin receive?

....

(Total 4 marks)

6. Show that the equation of the perpendicular bisector of (⁻2, 1) and (4, ⁻1) is $y = 3x - 3$.

(Total 3 marks)

7. Solve $\qquad\qquad 2x - 3y = 11$

$\qquad\qquad\qquad 5x + 2y = 18$

$x =$ .... , $y =$ ....

(Total 4 marks)

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

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

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

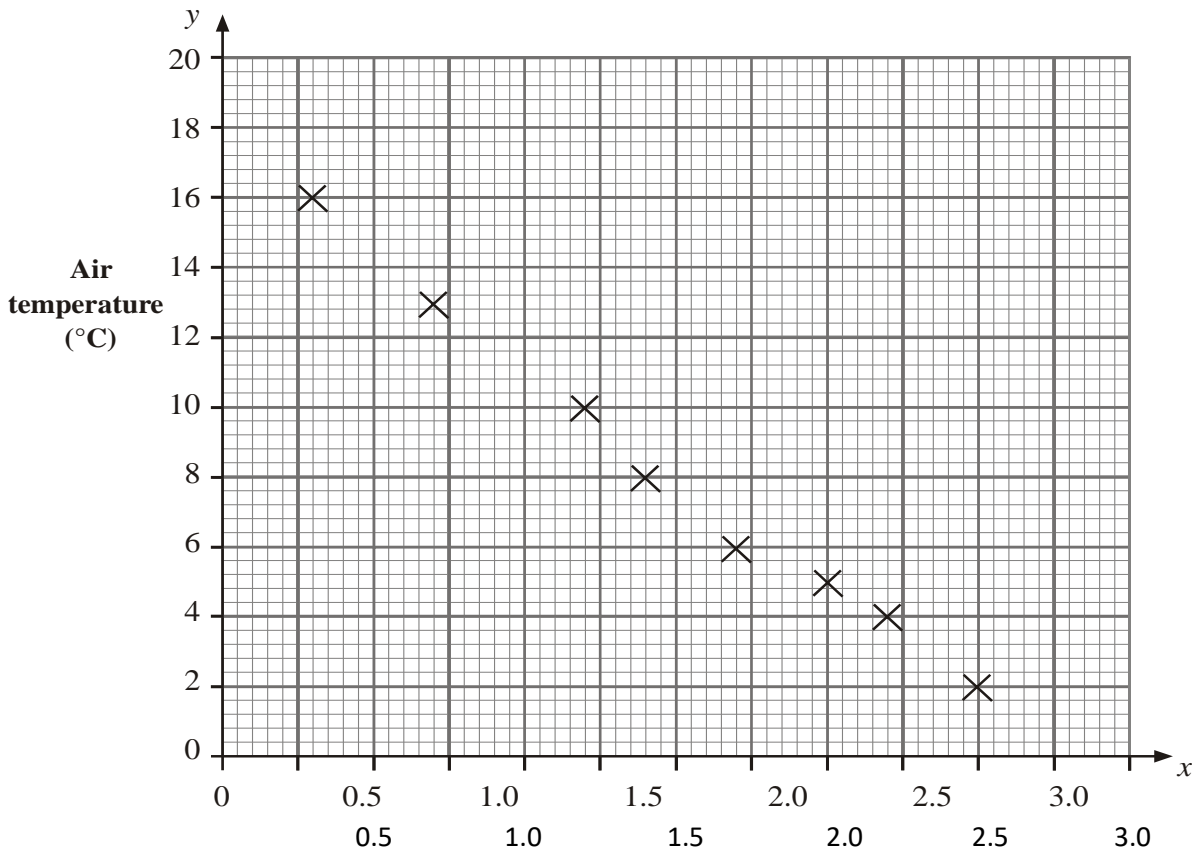What fraction of the total number of students in the school like sport?

....

(Total 4 marks)

9. On a particular day, a scientist recorded the air temperature at 8 different heights above sea level.
The scatter diagram shows the air temperature, y °C, at each of these heights, x km, above sea level.

Air temperature at different heights above sea level

(a) Using the scatter diagram, write down the air temperature recorded at a height of 2.5 km above sea level.

.... °C

(1)

(b) Describe the correlation between the air temperature and the height above sea level.

....

(1)

(c) Find an estimate of the height above sea level when the air temperature is 0 °C.

.... km

(2)

(Total 4 marks)
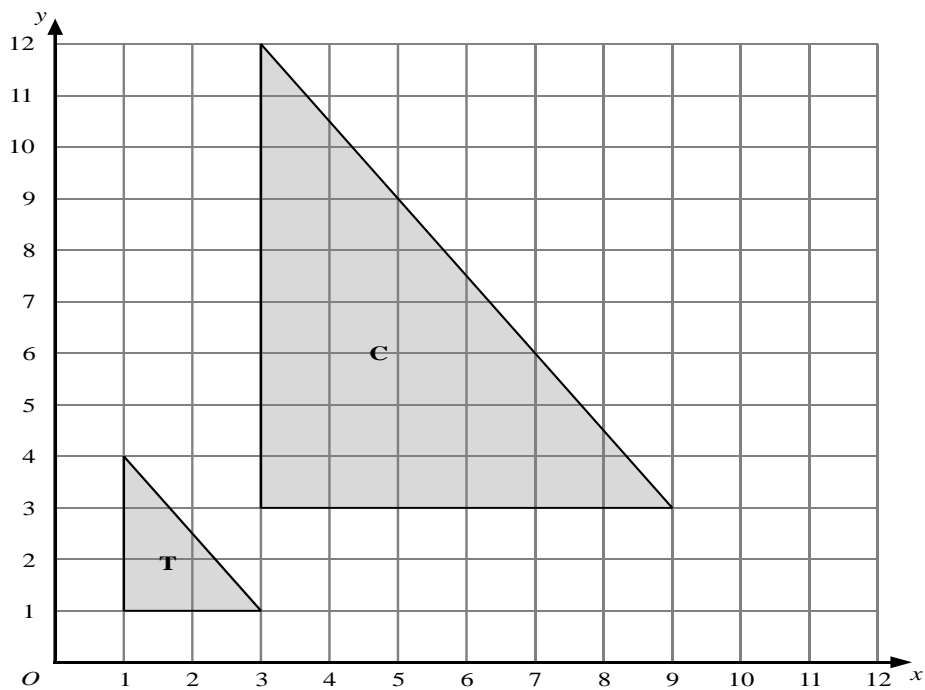
10.
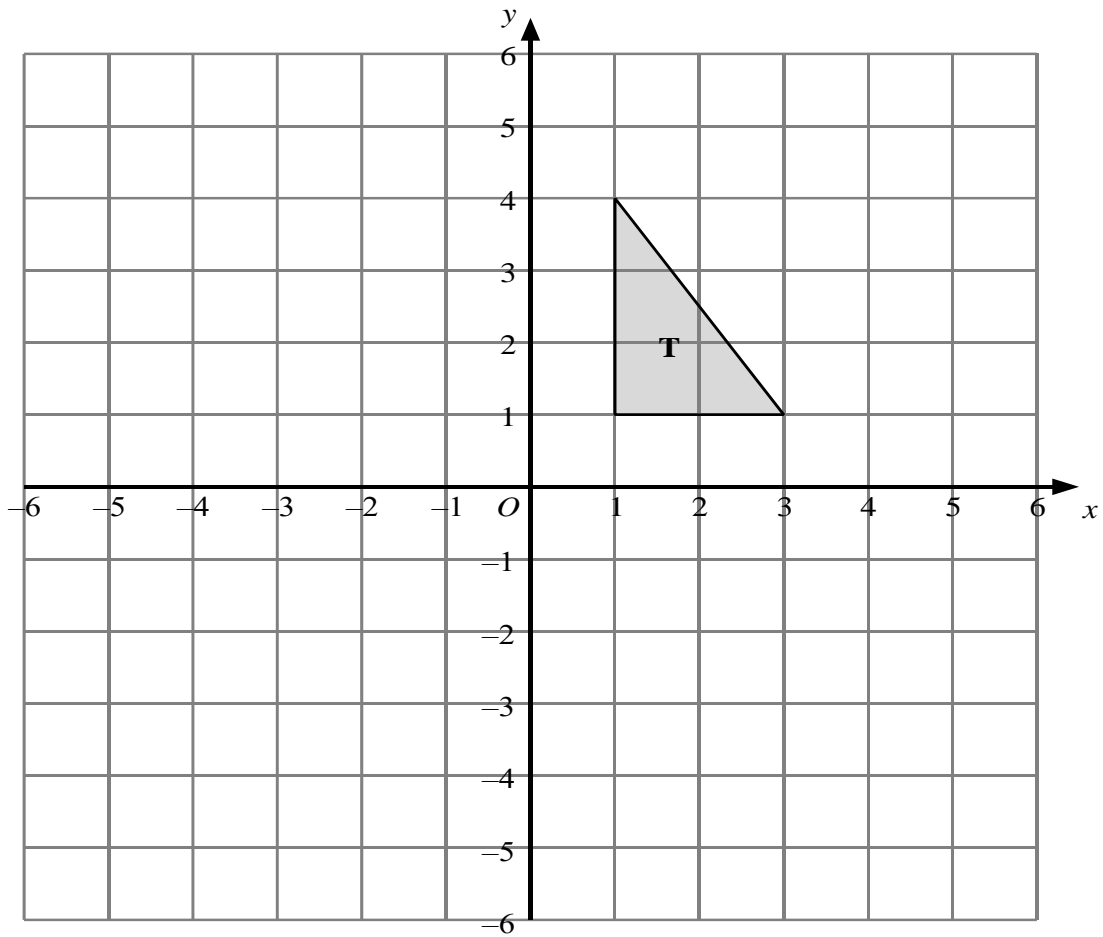
Triangle **T** has been drawn on the grid.

(a) Rotate triangle **T** clockwise through 90° about the point (–1, 0)
Label the new triangle **A**.

(2)

(b) Describe fully the single transformation which maps triangle **C** onto triangle **T**.

....

....

(3)

(Total 4 marks)

11. (a) Work out $1\frac{5}{8} + 3\frac{2}{3}$

....

(2)

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

....

(2)

(Total 4 marks)

12. (a) Express $0.\dot{2}\dot{9}$ as a fraction in its simplest form.

…………………………

(2)

x is an integer such that $1 \le x \le 9$

(b) Prove that $0.\dot{0}\dot{x} = \dfrac{x}{99}$

(2)

(Total 4 marks)

13   There are 10 boys and 20 girls in a class.
The class has a test.

The mean mark for all the class is 60.
The mean mark for the girls is 54.

Work out the mean mark for the boys.

....

(Total 3 marks)

14   Jules buys a washing machine.

20% VAT is added to the price of the washing machine.
Jules then has to pay a total of £600.

What is the price of the washing machine with **no** VAT added?

£...

(Total 2 marks)

15   Show that $(x + 1)(x + 2)(x + 3)$ can be written in the form $ax^3 + bx^2 + cx + d$
where a, b, c and d are positive integers.

(Total 3 marks)

16 The table shows a set of values for x and y.

x	1	2	3	4
y	9	$2\frac{1}{4}$	1	$\frac{9}{16}$

y is inversely proportional to the square of x.

(*a*) Find an equation for y in terms of x.

....
(2)

(*b*) Find the positive value of x when $y = 16$

....
(2)

(Total 4 marks)

**17.** 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.

Hawshaw Summer Fete
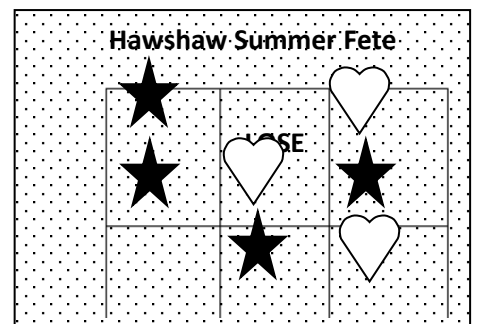
LOSE

....
(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)

18   For all values of x

$$f(x) = (x - 2)^2 \quad \text{and} \quad g(x) = 3(x - 4)$$
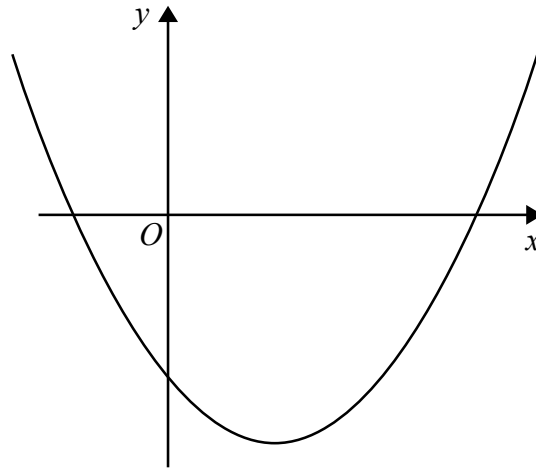
(*a*) Show that $gf(x) = 3x(x - 4)$

(2)

(*b*) Find $g^{-1}(9)$

....
(2)
(Total 4 marks)

19   Here is a sketch of a curve.

The equation of the curve is $y = x^2 + ax + b$ where a and b are integers.

The points $(0, -4)$ and $(4, 0)$ lie on the curve.

Find the coordinates of the turning point of the curve.

(........................ , ...)

(Total 4 marks)

20   There are only purple marbles and orange marbles in a bag.

There are three more purple marbles than orange marbles in the bag.
There are more than 12 marbles in the bag.

Roxanne is going to take at random two marbles from the bag.

The probability that Roxanne will take two marbles of the same colour is $\dfrac{43}{88}$

Work out the number of orange marbles in the bag.

21 Show that $\dfrac{3x+6}{x^2-3x-10} \div \dfrac{x+5}{x^3-25x}$ simplifies to ax where a is an integer.

(Total 4 marks)

22 Solve the inequality $x^2 > 3(x+6)$

....

(Total 4 marks)

23 The line l is a tangent to the circle $x^2 + y^2 = 40$ at the point A.
A is the point $(2, 6)$.

The line l crosses the x-axis at the point P.

Work out the area of triangle OAP.

....

(Total 5 marks)

24 (*a*) Show that $\sqrt{45} + \sqrt{20} = 5\sqrt{5}$
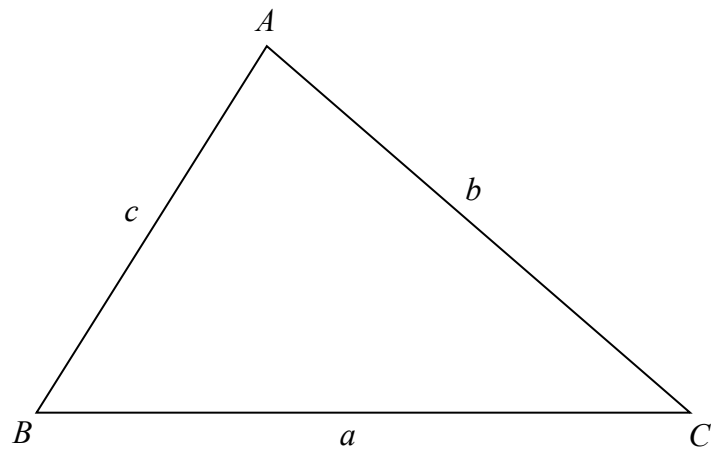Show your working clearly.

(2)

(*b*) Express $\dfrac{2}{\sqrt{3}-1}$ in the form $p + \sqrt{q}$

where p and q are integers.
Show your working clearly.

(**2**)

(**Total 4 marks**)

25   The diagram shows an acute-angled triangle *ABC*.

Prove that   area of triangle $ABC = \dfrac{1}{2}ab\sin C$

(**Total 3 marks**)