Write your name here

Surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9–1)

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics

Paper 1 (Non-Calculator)

Higher Tier

Thursday 24 May 2018 – Morning
Time: 1 hour 30 minutes

Paper Reference
1MA1/1H

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Total Marks

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

Information

- The total mark for this paper is 80
- 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 the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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Pearson

Please note that these worked solutions have neither been provided nor approved by Pearson Education and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

Anything written in green in a cloud doesn't have to be written in the exam.

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

.CG Maths.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Work out $2\frac{1}{7} + 1\frac{1}{4}$

Convert the mixed numbers into improper fractions by multiplying the whole number by the denominator then adding the result to the numerator. Then convert the fractions into equivalent fractions with the same denominators

.....

(2)

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

Give your answer as a mixed number in its simplest form.

Convert the mixed number into an improper fraction by multiplying the whole number by the denominator then adding the result to the numerator. Divide the fractions by keeping the first fraction, changing the sign to multiplication and flipping the second fraction. Then simplify and convert to a mixed number

.....

(2)

(Total for Question 1 is 4 marks)

2 In a village

the number of houses and the number of flats are in the ratio 7 : 4
the number of flats and the number of bungalows are in the ratio 8 : 5

There are 50 bungalows in the village.

How many houses are there in the village?

Flats are common to both ratios so we need to work out the number of flats.

5 parts of the ratio 8:5 is worth 50. Use this to calculate the worth of 1 part then 8 parts. The worth of 8 parts is the number of flats.

4 parts of the ratio 7:4 represent the same number of flats. Work out the worth of 1 part of this ratio then the worth of 7 to get the number of houses

.....

(Total for Question 2 is 3 marks)

3 Renee buys 5 kg of sweets to sell.
She pays £10 for the sweets.

Renee puts all the sweets into bags.
She puts 250 g of sweets into each bag.
She sells each bag of sweets for 65p.

Renee sells all the bags of sweets.

Work out her percentage profit.

There are 1000g in 1kg so 5kg is 5000g. Work out how many 250g bags go into 5000g to find how many bags she sells.

Multiply the number of bags she sells by the 65p price to work out her income.

Profit = income - costs

Express the profit as a fraction of the costs then multiply it by 100 to convert it into a percentage

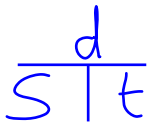
.....%

(Total for Question 3 is 4 marks)

4 A cycle race across America is 3069.25 miles in length.

Juan knows his average speed for his previous races is 15.12 miles per hour.
For the next race across America he will cycle for 8 hours per day.

(a) Estimate how many days Juan will take to complete the race.



From the formula triangle, time = distance/speed

Round the distance and speed to rough amounts then calculate the number of hours needed to do the race. Divide the number of hours by 8 to work out the number of days needed

.....

(3)

Juan trains for the race.
The average speed he can cycle at increases.
It is now 16.27 miles per hour.

(b) How does this affect your answer to part (a)?

time = distance/speed
What effect does increasing the speed have on the time?

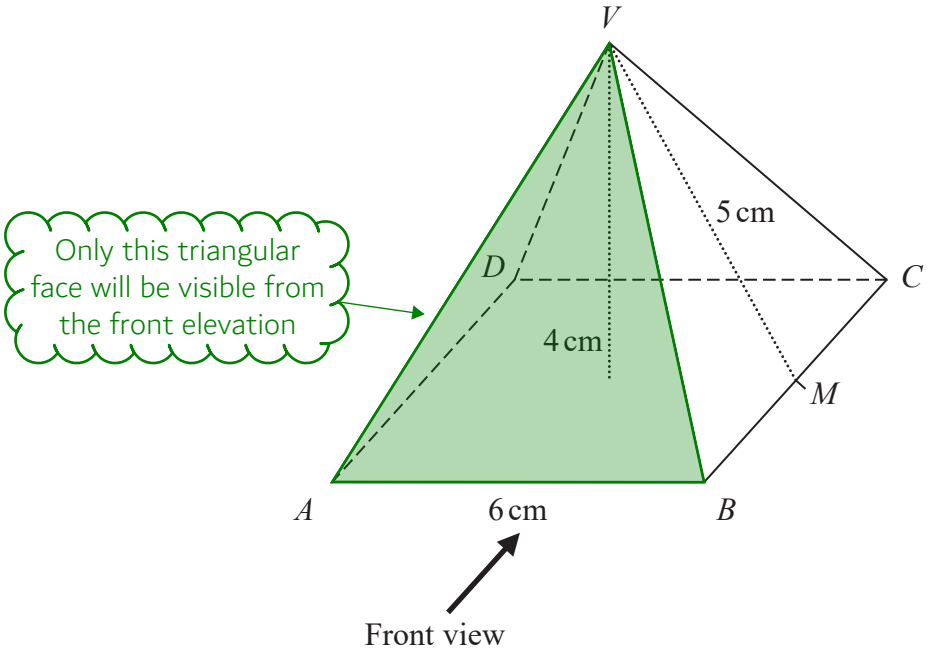
.....

.....

(1)

(Total for Question 4 is 4 marks)

5 Here is a solid square-based pyramid, *VABCD*.



The base of the pyramid is a square of side 6 cm.
The height of the pyramid is 4 cm.
M is the midpoint of *BC* and *VM* = 5 cm.

(a) Draw an accurate front elevation of the pyramid from the direction of the arrow.

(2)

(b) Work out the total surface area of the pyramid.

There is a square face and 4 triangular faces. The area of all of these need to be added together.
Area of a square = length squared
1/2 x base x height = area of a triangle

Don't forget to include units as these aren't given

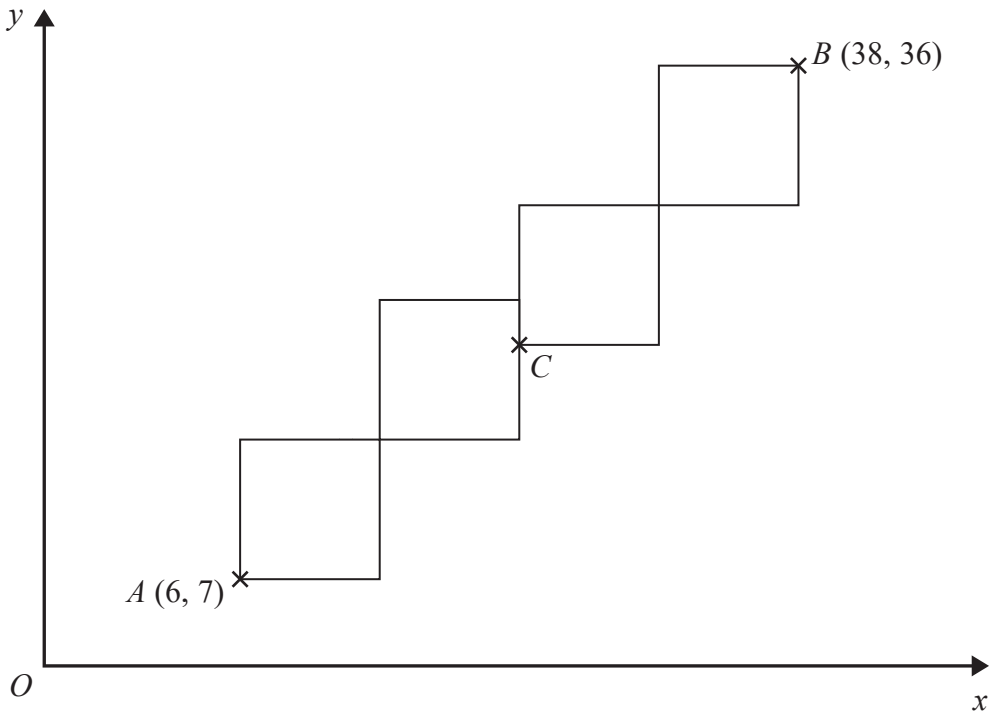
.....

(4)

(Total for Question 5 is 6 marks)

6 A pattern is made from four identical squares.

The sides of the squares are parallel to the axes.



Point A has coordinates (6, 7)
Point B has coordinates (38, 36)
Point C is marked on the diagram.

Work out the coordinates of C.

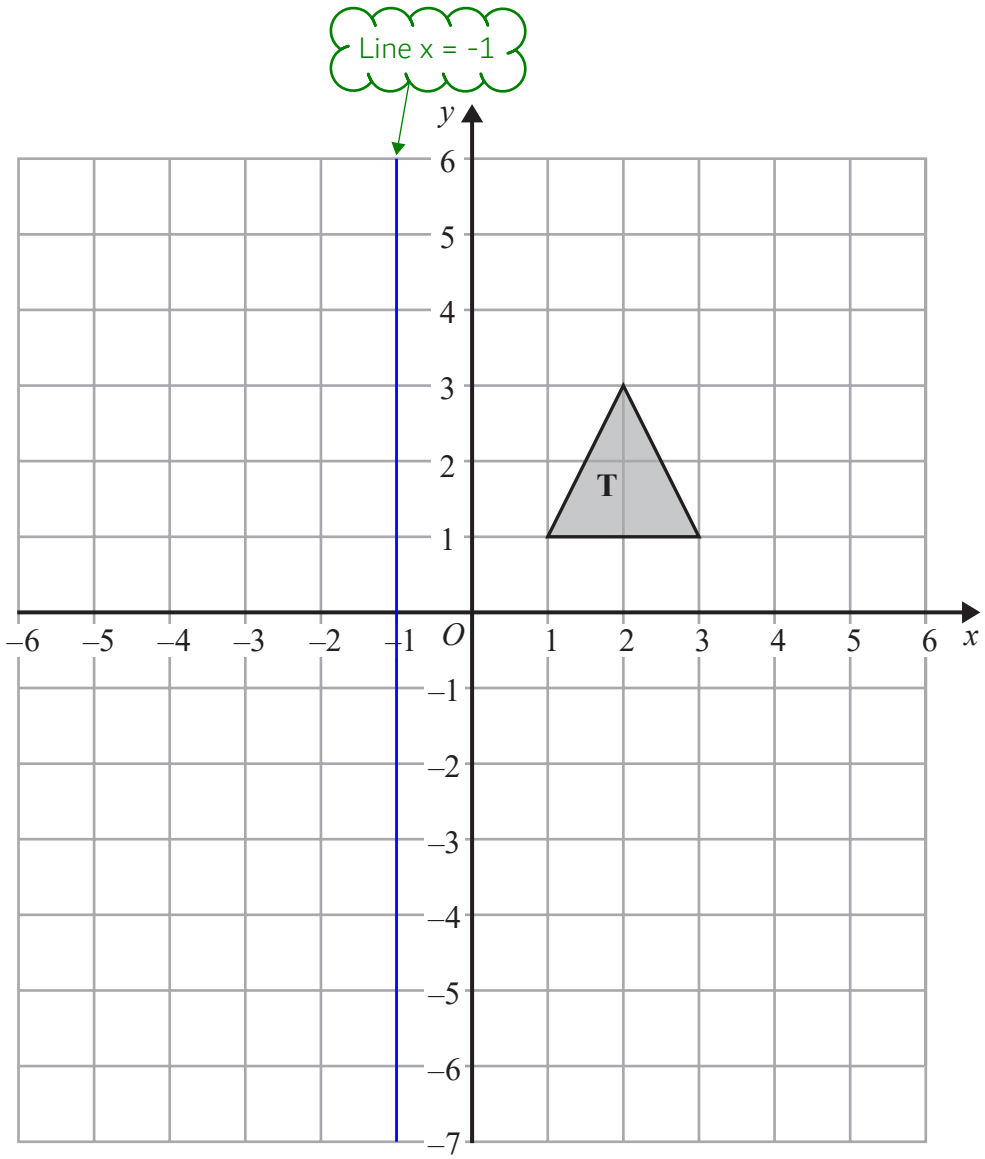
C is two squares to the left and two squares down from B. If we work out the length of one of the squares, we can work out the coordinates of C.

Four squares is the same length as the distance between A and B in the x direction

(..... , ...)

(Total for Question 6 is 5 marks)

7



Shape **T** is reflected in the line $x = -1$ to give shape **R**.
Shape **R** is reflected in the line $y = -2$ to give shape **S**.

Describe the **single** transformation that will map shape **T** to shape **S**.

First draw Shape R and Shape S. To reflect, count the number of jumps to the mirror line (in the direction perpendicular to the line) then do the same number of jumps on the other side. Transformations include enlargement, rotation, reflection and translation

(Total for Question 7 is 2 marks)

8 The perimeter of a right-angled triangle is 72 cm.
The lengths of its sides are in the ratio 3 : 4 : 5

Work out the area of the triangle.

1/2 x base x height = area of triangle
Divide the perimeter into the ratio to find each of the sides. The longest side is opposite the right angle

.....cm^2

(Total for Question 8 is 4 marks)

9 (a) Write down the value of $36^{\frac{1}{2}}$

To the power of 1/2 means positive square root

.....

(1)

(b) Write down the value of 23^0

Anything to the power of 0 is 1

.....

(1)

(c) Work out the value of $27^{-\frac{2}{3}}$

The over 3 means cube root. The 2 means to square. The negative means to take the reciprocal

.....

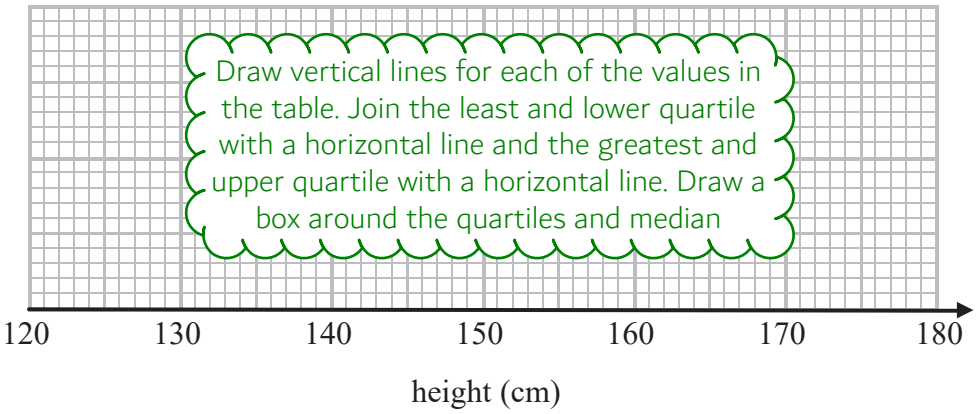
(2)

(Total for Question 9 is 4 marks)

10 The table gives some information about the heights of 80 girls.

Least height	133 cm
Greatest height	170 cm
Lower quartile	145 cm
Upper quartile	157 cm
Median	151 cm

(a) Draw a box plot to represent this information.



(3)

(b) Work out an estimate for the number of these girls with a height between 133 cm and 157 cm.

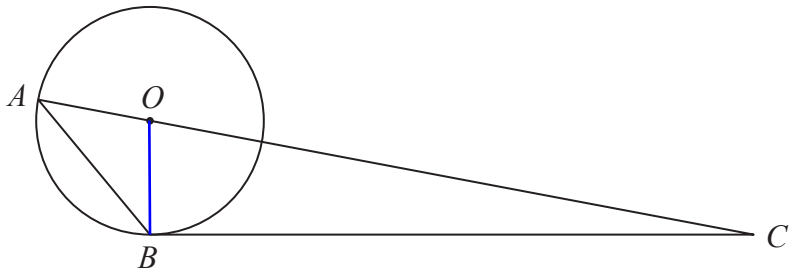
1/4 of the data is between the least and lower quartile. 1/4 of the data is between the lower quartile and median. 1/4 of the data is between the median and upper quartile.

.....

(2)

(Total for Question 10 is 5 marks)

11



A and B are points on a circle, centre O.

BC is a tangent to the circle.
AOC is a straight line.
Angle $ABO = x°$.

Find the size of angle ACB, in terms of x.
Give your answer in its simplest form.
Give reasons for each stage of your working.

ACB can be found using the following facts: the base angles of an isosceles triangle are equal, the angle between a tangent and a radius is 90° and angles in a triangle add up to 180°

(Total for Question 11 is 5 marks)

12 Prove that the square of an odd number is always 1 more than a multiple of 4

2n is an even number. Adding 1 makes it odd. Express an odd number in terms of n then square it. Expand the square bracket. Bring out 4 as a factor on all the terms we can to show that part of it is a multiple of 4, but there should be +1 left over to show it is one more than a multiple of 4

(Total for Question 12 is 4 marks)

13 $\sqrt{5}(\sqrt{8} + \sqrt{18})$ can be written in the form $a\sqrt{10}$ where a is an integer.

Find the value of a.

$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$

Expand the brackets then simplify the surds. To simplify, bring out a surd which can be square rooted to give a whole number. Then add the simplified surds

$a =$ .....

(Total for Question 13 is 3 marks)

14 y is inversely proportional to d^2
When $d = 10$, $y = 4$

d is directly proportional to x^2
When $x = 2$, $d = 24$

Find a formula for y in terms of x.
Give your answer in its simplest form.

$y = \frac{k}{d^2}$

Converting 'y is inversely proportional to d^2' into an equation

1. Rearrange and substitute in the values of d and y to find k. Substitute k back into the equation so we have an equation for y in terms of d.

2. Express d is directly proportional to x^2 as an equation. Rearrange and substitute in the values of x and d to find the constant. We now have an equation for d in terms of x.

3. Substitute an expression for d in terms of x into the equation for y in terms of d.

4. Simplify

.....

(Total for Question 14 is 5 marks)

15 (a) Factorise $a^2 - b^2$

Difference of two squares

.....

(1)

(b) Hence, or otherwise, simplify fully $(x^2 + 4)^2 - (x^2 - 2)^2$

$a = x^2 + 4$ and $b = x^2 - 2$
Substitute these into the factorised form of $a^2 - b^2$

.....

(3)

(Total for Question 15 is 4 marks)

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16 There are only red counters, blue counters and purple counters in a bag.
The ratio of the number of red counters to the number of blue counters is 3 : 17

Sam takes at random a counter from the bag.
The probability that the counter is purple is 0.2

Work out the probability that Sam takes a red counter.

$1 - 0.2 = 0.8$ ← This works out the probability of getting red or blue

There are 20 parts in total in the ratio. These represent the probability of 0.8. Work out what 1 part is worth then what 3 parts are worth. This is the probability of taking a red counter

.....

(Total for Question 16 is 3 marks)

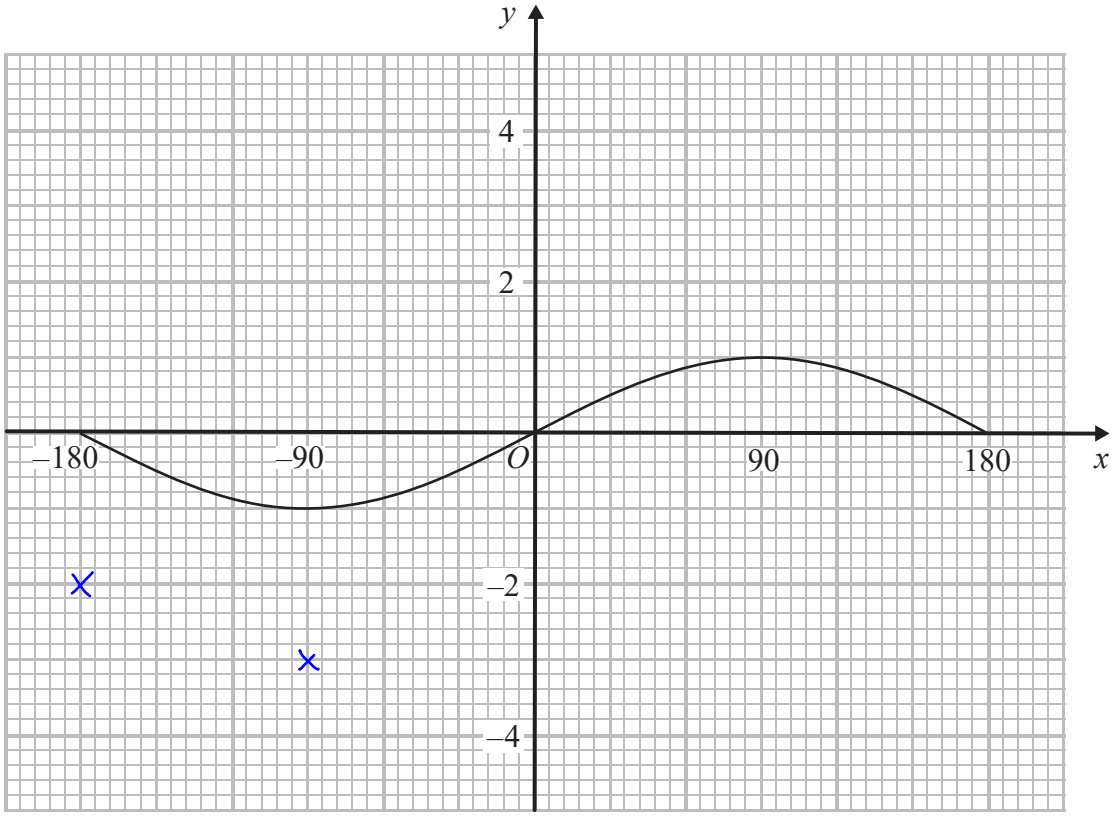
17 Simplify fully $\dfrac{3x^2 - 8x - 3}{2x^2 - 6x}$

Factorise both the numerator and denominator to try and cancel out any common factors

.....

(Total for Question 17 is 3 marks)

18 Here is the graph of $y = \sin x°$ for $-180 \leqslant x \leqslant 180$



On the grid, sketch the graph of $y = \sin x° - 2$ for $-180 \leqslant x \leqslant 180$

Subtract 2 from each of the y values for each x value

(Total for Question 18 is 2 marks)

19 The point P has coordinates (3, 4)
The point Q has coordinates (a, b)

A line perpendicular to PQ is given by the equation $3x + 2y = 7$

Find an expression for b in terms of a.

1. Rearrange the equation of the perpendicular line into the form y = mx + c, where m is the gradient and c is the y intercept.

2. Express PQ in the form y = mx + c. The gradient is the negative reciprocal of the gradient of the perpendicular line and c needs to be found.

3. Find c by rearranging the equation and substituting in the x and y values from point P.

4. Substitute a and b for x and y in the completed equation of PQ

.....

(Total for Question 19 is 5 marks)

20 n is an integer such that $3n + 2 \leqslant 14$ and $\dfrac{6n}{n^2 + 5} > 1$

Find all the possible values of n.

1. Rearrange the first inequality to solve for n.

2. Rearranging the second inequality into the quadratic form $ax^2 + bx + c$ with 0 on the other side then factorise it.

3. Draw a sketch of the graph of the second inequality to see where it is less than 0.

4. Express the solved inequalities and combine them together.

5. List the integers which satisfy the inequalities.

.....

(Total for Question 20 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS