Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics B

Unit 3: Number, Algebra, Geometry 2 (Calculator)

Higher Tier

Tuesday 8 November 2016 – Morning
Time: 1 hour 45 minutes

Paper Reference
5MB3H/01

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. 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.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

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.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

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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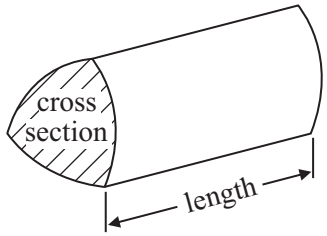
PEARSON

GCSE Mathematics 2MB01

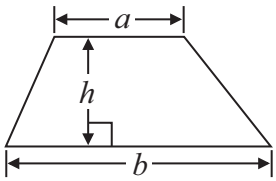
Formulae: Higher Tier

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 × length

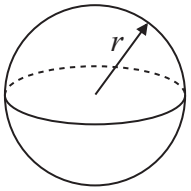


Area of trapezium = $\frac{1}{2}(a + b)h$



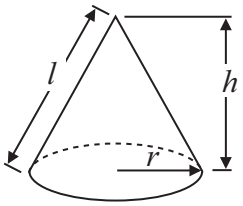
Volume of sphere = $\frac{4}{3}\pi r^3$

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

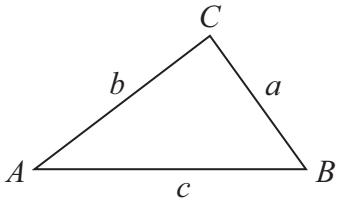


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



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 questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Jane bought a house for £60 000
She then sold the house for a profit of 12%.

Work out how much Jane sold the house for.

£.....

(Total for Question 1 is 2 marks)

2 Ben and Lago have some identical packets.

Ben has 20 of the packets.
The total weight of Ben's packets is 32 kg.

Lago has 25 of the packets.

Work out the total weight of Lago's packets.

..... kg

(Total for Question 2 is 2 marks)

3

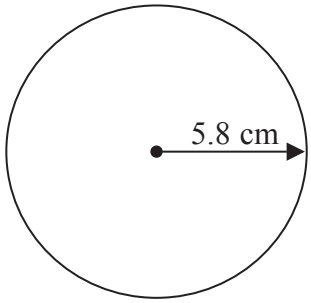


Diagram **NOT** accurately drawn

This circle has a radius of 5.8 cm.

Work out the area of the circle.
Give your answer to 1 decimal place.

..... cm^2

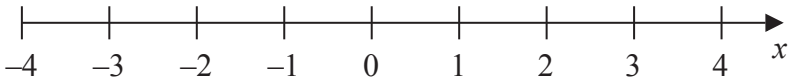
(Total for Question 3 is 2 marks)

4 Use ruler and compasses to construct the perpendicular bisector of the line AB.
You must show all your construction lines.

(Total for Question 4 is 2 marks)

5 (a) $x > -2$

Show this inequality on the number line.



(2)

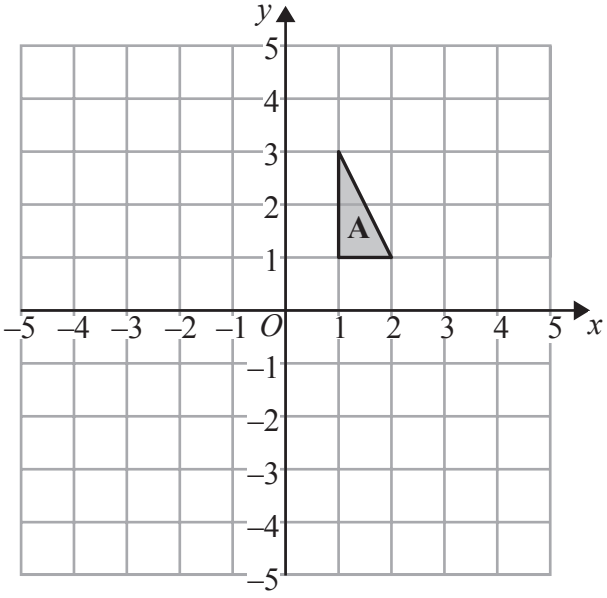
(b) Work out the greatest integer that satisfies the inequality

$$4y - 1 < y + 7$$

(3)

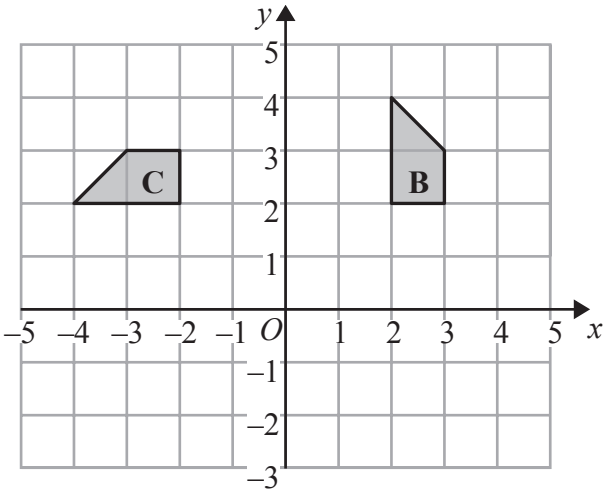
(Total for Question 5 is 5 marks)

6



(a) On the grid above, translate shape **A** by the vector $\begin{pmatrix} -3 \\ -1 \end{pmatrix}$

(2)



(b) Describe fully the single transformation that maps shape **B** onto shape **C**.

.....

.....

.....

(3)

(Total for Question 6 is 5 marks)

***7** There are 1 million gallons of water in a lake.

A company has to pump all the water out of the lake.

The company can use 4 Speedy pumps or 5 Flow pumps.

One Speedy pump can pump 35 gallons out of the lake in 1 minute.
One Flow pump can pump all the water out of the lake in 500 hours.

The company wants to pump all the water out of the lake as quickly as possible.

Should the company use the 4 Speedy pumps or the 5 Flow pumps?
You must show all your working.

(Total for Question 7 is 5 marks)

8 Change 2 m^3 to cm^3.

..... cm^3

(Total for Question 8 is 2 marks)

***9** The normal price of a watch is £80 in two shops, Tymes and Sekonds.

Both shops have a sale.

In Tymes the normal price of the watch is reduced by £18
In Sekonds the normal price of the watch is reduced by 20%

Which shop is selling the watch for the cheaper price in the sale?
You must show your working.

(Total for Question 9 is 3 marks)

10 The diagram shows the positions of two lighthouses, *A* and *B*, on a map.

A ship is on a bearing of 070° from *A*.
The ship is also on a bearing of 320° from *B*.

Mark the position of the ship with a cross (×) and label it *C*.

(Total for Question 10 is 3 marks)

11 *DEF* is a right-angled triangle.

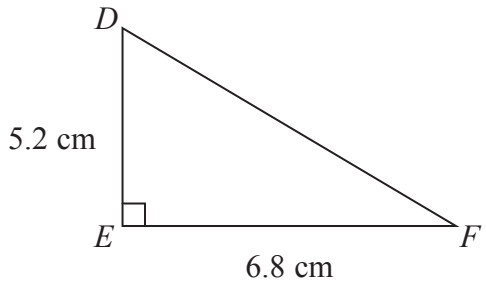


Diagram **NOT** accurately drawn

Work out the length of *DF*.
Give your answer correct to 2 decimal places.

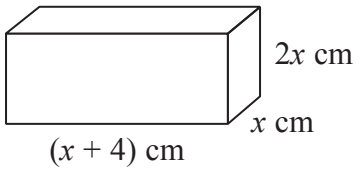
.....cm

(Total for Question 11 is 3 marks)

12 A cuboid has dimensions $2x$ cm, x cm and $(x + 4)$ cm.

The volume of the cuboid is 180 cm^3.

Diagram **NOT** accurately drawn



(a) Show that $x^3 + 4x^2 = 90$

(2)

The equation $x^3 + 4x^2 = 90$ has a solution between $x = 3$ and $x = 4$

(b) Use a trial and improvement method to find this solution.
Give your answer correct to 1 decimal place.
You must show all your working.

(4)

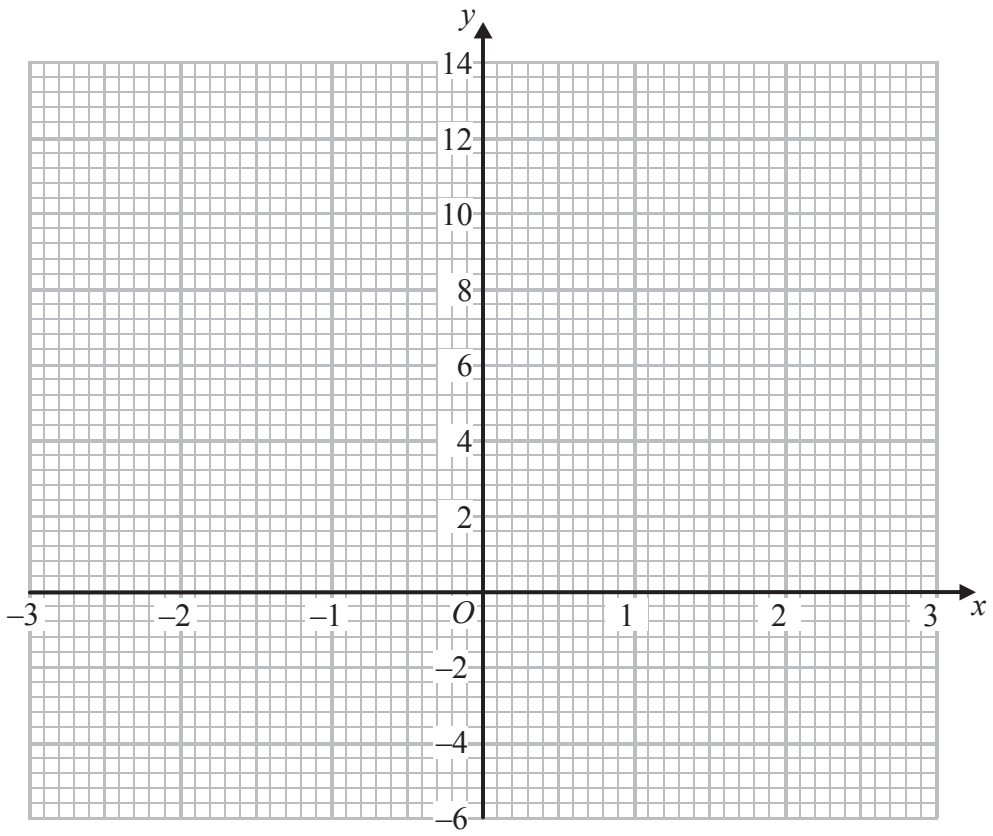
(Total for Question 12 is 6 marks)

13 (a) Complete the table of values for $y = x^3 - 6x + 4$

x	−3	−2	−1	0	1	2	3
y	−5		9			0	13

(2)

(b) On the grid, draw the graph of $y = x^3 - 6x + 4$ for values of x from −3 to 3



(2)

(Total for Question 13 is 4 marks)

14 Solve the simultaneous equations

$$5x + 2y = -2$$
$$3x - 5y = 11.2$$

$x =$ .....

$y =$ .....

(Total for Question 14 is 4 marks)

15 Make d the subject of the formula

$$p = \frac{d}{e} + f$$

.....

(Total for Question 15 is 2 marks)

***16**

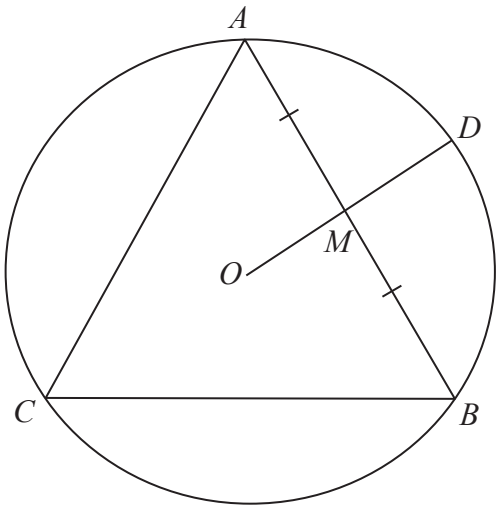


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on the circumference of a circle, centre *O*.

ABC is an equilateral triangle.
OD bisects side *AB* at *M*.

Prove that *ODA* is an equilateral triangle.
Give reasons for each stage of your working.

(Total for Question 16 is 4 marks)

17

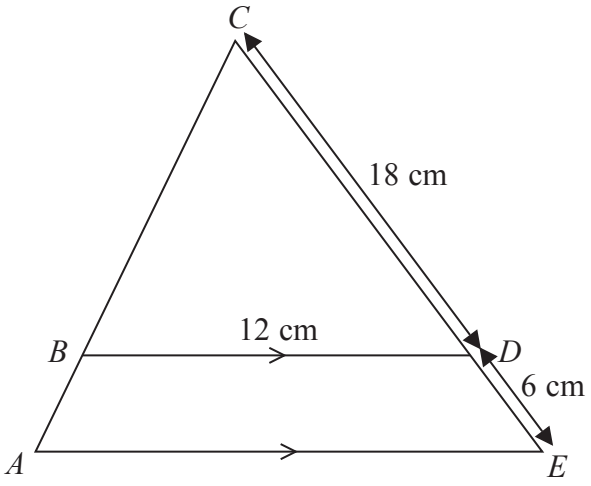


Diagram **NOT** accurately drawn

ABC and *CDE* are straight lines.
BD and *AE* are parallel.
BD = 12 cm, *CD* = 18 cm, *DE* = 6 cm.

Work out the length of *AE*.

..... cm

(Total for Question 17 is 2 marks)

18 A spacecraft travels from Earth to Mars at an average speed of 13 km/s.

The spacecraft travels a distance of 1.4×10^8 miles.

Calculate the number of days the spacecraft takes to travel from Earth to Mars.

You may use

1 mile = 1.6 km
1 km/s = 2250 miles per hour

..... days

(Total for Question 18 is 3 marks)

19 (a) Solve $x^2 + 2x - 35 = 0$

(3)

(b) Solve $\dfrac{2}{x+1} + \dfrac{x}{2x+3} = 1$

Give your solutions as surds.

(4)

(Total for Question 19 is 7 marks)

20 Prove algebraically that the recurring decimal $0.1\dot{7}\dot{8}$ can be written as the fraction $\frac{59}{330}$

(Total for Question 20 is 3 marks)

21 Helen invested £6000 for n years in a savings account.
She got 3% compound interest each year.

At the end of n years Helen had £7379.24 in her savings account.

Work out the value of n.
You must show your working.

(Total for Question 21 is 2 marks)

22

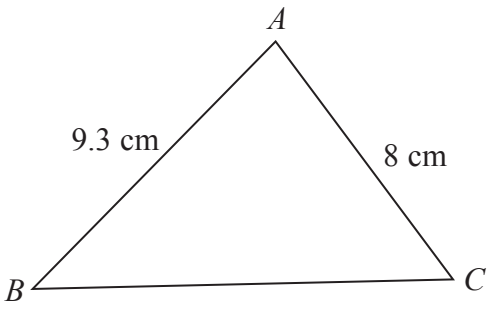


Diagram **NOT** accurately drawn

$AB = 9.3$ cm
$AC = 8$ cm
Angle BAC is an acute angle.

The area of triangle ABC is 32 cm^2.

Work out the length of BC.
You must show your working.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 22 is 5 marks)

23 A machine puts drinks into cups.
The volume of a cup is 200 m*l*, correct to the nearest 0.5 m*l*.

(a) Write down the lower bound for the volume of a cup.

..... m*l*

(1)

The machine puts tea and milk into each cup.
It puts into each cup

175 m*l* of tea measured correct to the nearest m*l*
24 m*l* of milk measured correct to the nearest m*l*

*(b) Is it possible that the total volume of tea and milk put in a cup is greater than the volume of the cup?
You must show how you get your answer.

(3)

(Total for Question 23 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS