

For Edexcel

Name

# GCSE Mathematics

Unit 3 – Section A – (Non-Calculator)

## Higher Tier

Terminal Paper A

Time: 1 hour 10 minutes



### Materials required

Ruler, protractor, compasses,  
pen, pencil, eraser.  
Tracing paper may be used.

### Instructions and Information for Candidates

Write your name in the box at the top of the page.

Answer all the questions in the spaces provided in this question paper.

The marks for each question and for each part of a question are shown in brackets.

The total mark for this paper is 60. There are 17 questions in this paper.

**Calculators must not be used.**

### Advice to Candidates

Show all stages in any calculation.

Work steadily through the paper. Do not spend too long on one question.

If you cannot answer a question, leave it and attempt the next one.

Return at the end to those you have left out.

*Churchill  
Maths*



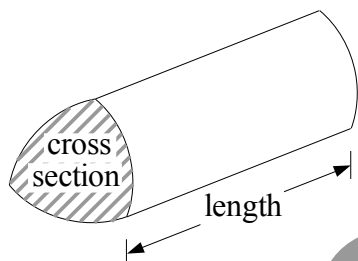
Written by Shaun Armstrong

Only to be copied for use in the purchaser's school or college

## GCSE Mathematics

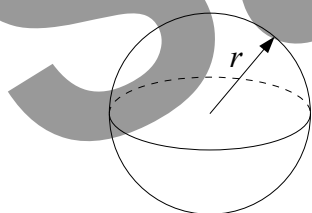
### Formulae: Higher Tier

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



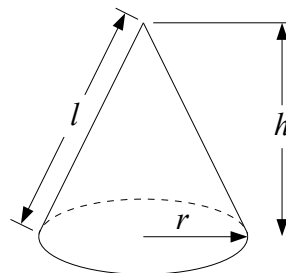
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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

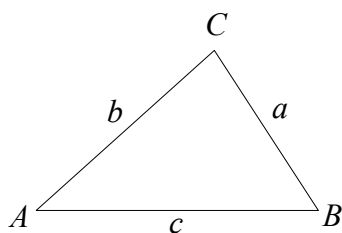


**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

**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 SEVENTEEN questions.**

**Write your answers in the spaces provided.**

**You must NOT use a calculator.**

**You must write down all the stages in your working.**

1. Here are the ingredients for making 6 pots of chocolate mousse.

**Ingredients**

6 eggs

30 g of butter

320 g of chocolate

a pinch of salt

Frank has to make 12 pots of chocolate mousse.

- (a) How much chocolate does he need?

..... g  
(2)

Later on, Frank needs to make 4 more pots.

- (b) Work out how much butter he needs to make 4 pots of chocolate mousse.

..... g  
(2)

**(Total 4 marks)**

Q1

2. (a) Write  $\frac{3}{20}$  as a decimal.

(b) Work out  $\frac{4}{9}$  of 63.

.....  
(2)

.....  
Q2

(2)  
(Total 4 marks)

3. Solve  $5p + 9 = p - 3$

$p =$  .....

Q3

(Total 3 marks)

4. The table shows some expressions.  
 $a, b, c$  and  $d$  represent lengths.  
 $\pi$  and 2 are numbers which have no dimensions.

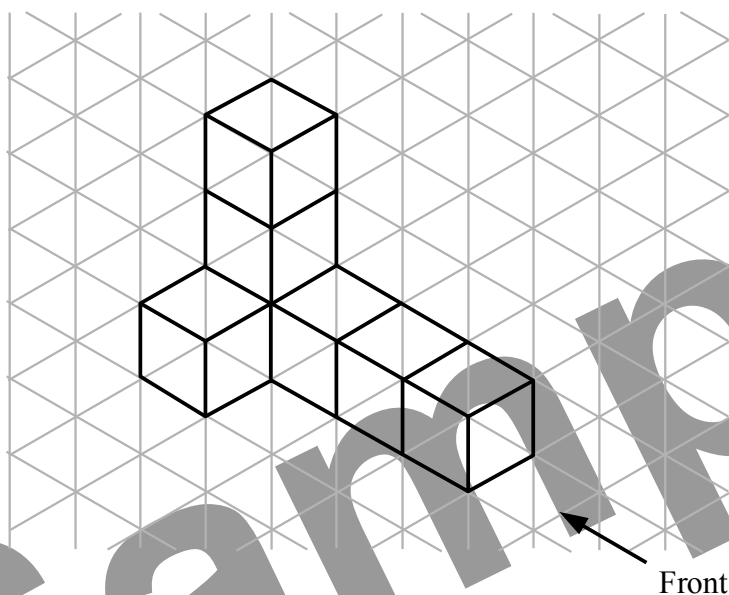
$\pi ab$	$\frac{a^2 c^2}{d}$	$2\pi b^3$	$abc + d$	$\frac{2d}{b^4}$	$b(c^2 + d^2)$	$c^3 + 2ab$

Tick (✓) the boxes underneath the **three** expressions which could represent volumes.

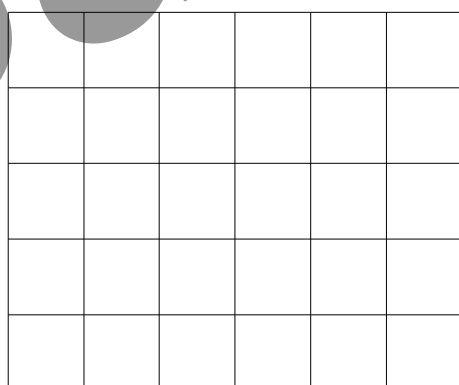
Q4

(Total 3 marks)

5. The diagram shows a 3-D shape made from cubes.

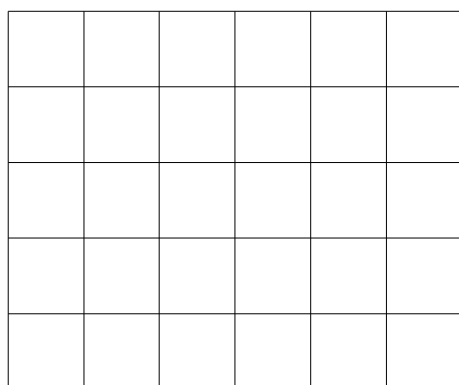


(a) On the grid, draw the front elevation of the shape from the direction shown.



(2)

(b) On the grid, draw the plan of the shape.



(2)

(Total 4 marks)

Q5

6. (a) Work out the value of  $6p + 5q$  when  $p = 3$  and  $q = -2$ .

(2)

(b) Expand and simplify  $(a - 4)(a + 4)$

(2)

(Total 4 marks)

Q6

7.

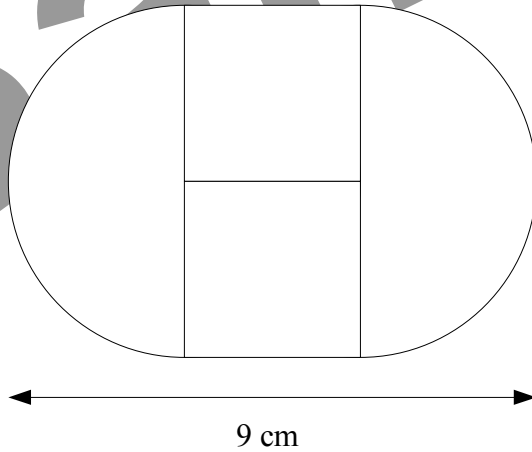


Diagram **NOT** accurately drawn

The shape above is made from two squares and two semi-circles.

The radius of each semi-circle is the same as the length of the side of each square.  
The length of the shape is 9 cm.

Find the area of the shape.  
Give your answer in terms of  $\pi$ .

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

(Total 4 marks)

Q7

8. Tariq's bicycle has three gears.

The numbers of teeth on the gears are in the ratio  $5 : 6 : 7$

In total there are 36 teeth on the gears.

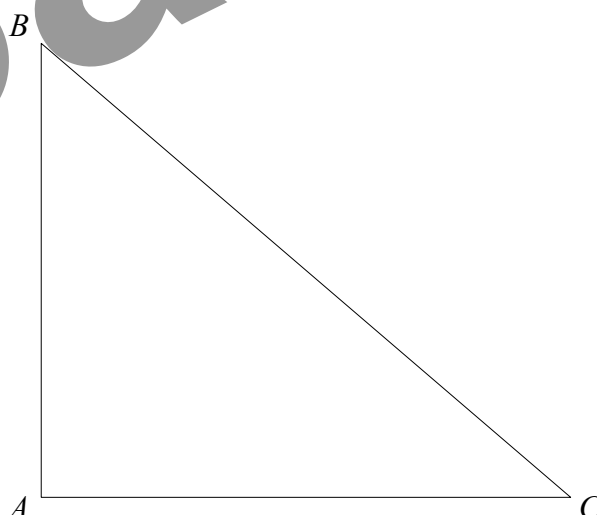
Work out how many teeth are on the middle gear.

.....

**(Total 3 marks)**

**Q8**

9.



$ABC$  is a triangle.

Shade the region inside the triangle which is nearer to point  $A$  than point  $C$  **and** less than 5 cm from the point  $C$ .

**(Total 4 marks)**

**Q9**

10. Work out  $4\frac{1}{5} - 1\frac{2}{3}$

Q10

(Total 3 marks)

11. The ages of three sisters are  $x$  years,  $x^2$  years and  $(3x - 2)$  years.

The total of the ages of the three sisters is 30 years.

(a) Show that  $x^2 + 4x - 32 = 0$

(2)

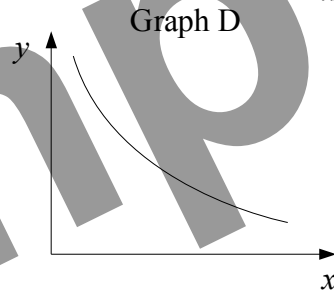
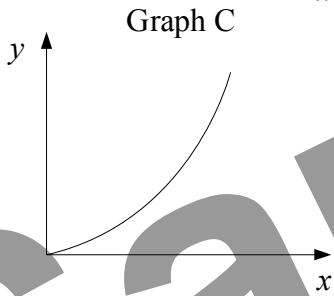
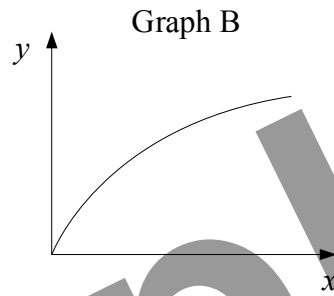
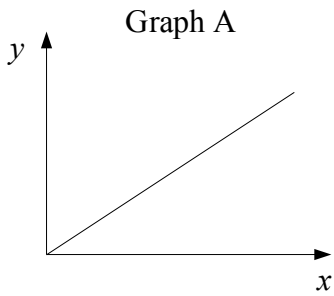
(b) Find the age of the oldest of the three sisters.

..... years  
(3)

(Total 5 marks)

Q11

12. Here are four sketch graphs.



Write down the letter of the graph which could represent each relationship.

(a)  $y$  is proportional to the square root of  $x$ .

Graph .....  
(1)

(b)  $y$  is inversely proportional to  $x$ .

Graph .....  
(1)

**(Total 2 marks)**

Q12

13. Simplify  $\sqrt{27} + 5\sqrt{12}$

Q13

(Total 3 marks)

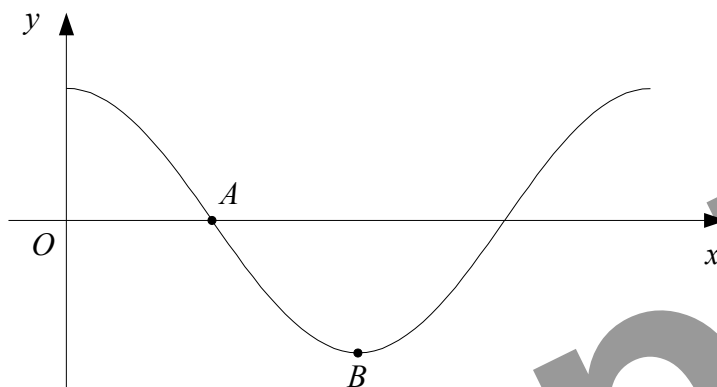
14. Show that  $x^2 - 8x + 19$  can be written in the form  $(x + a)^2 + b$  for all values of  $x$ .  
State the value of  $a$  and the value of  $b$ .

 $a = \dots\dots\dots$  $b = \dots\dots\dots$ 

Q14

(Total 3 marks)

15.



The diagram shows a sketch of part of the graph of  $y = \cos x^\circ$ .

(a) Write down the coordinates of

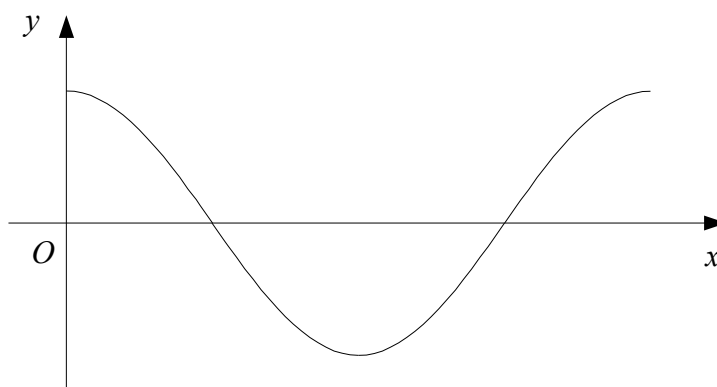
(i)  $A$ ,

(....., .....) (2)

(ii)  $B$ .

(....., .....) (2)

(b) On this copy of the diagram above, sketch the graph of  $y = \cos 2x^\circ$ .

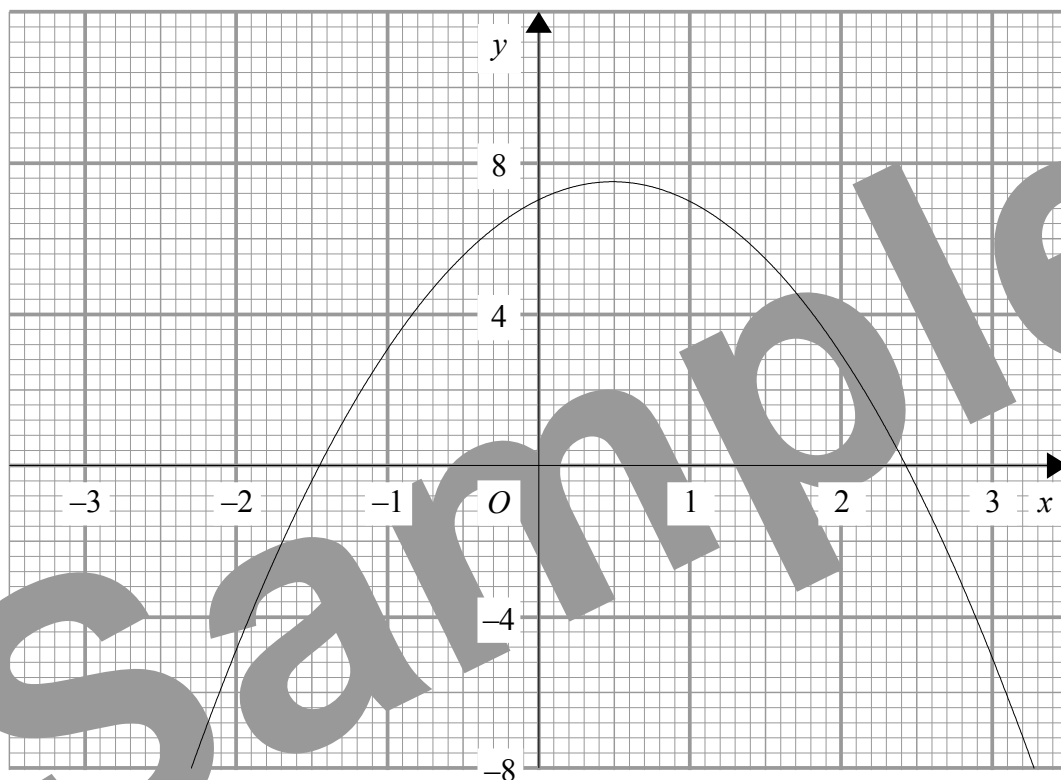


(2)

(Total 4 marks)

Q15

16.



The diagram shows the graph of  $y = 7 + 2x - 2x^2$

- (a) Use the graph to estimate the solutions to the equation

$$7 + 2x - 2x^2 = 0$$

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  (1)

- (b) Explain how, using the graph, you can tell that there are no solutions to the equation

$$2x - 2x^2 = 1$$

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

(2)

(Total 3 marks)

Q16

17.

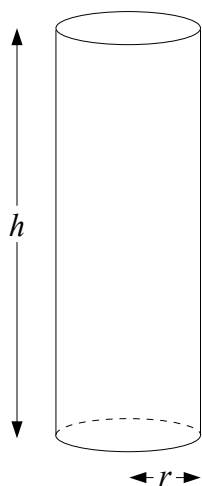
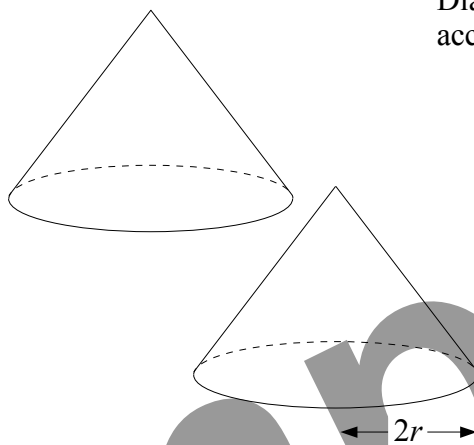


Diagram NOT  
accurately drawn



Some plasticine is used to make a solid cylinder of base radius  $r$  cm and height  $h$  cm. The plasticine is then split in half and used to make two identical cones. Each cone has base radius  $2r$  cm and height  $H$  cm.

Express  $H$  in terms of  $h$ .  
Give your answer in its simplest form.

$H = \dots\dots\dots$

Q17

(Total 4 marks)

**TOTAL FOR SECTION: 60 MARKS**

**END**