Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Applications of Mathematics

Unit 2: Applications 2

For Approved Pilot Centres ONLY

Higher Tier

Mock Exam Paper
Time: 1 hour 45 minutes

Paper Reference
5AM2H/01

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

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 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.

Turn over ▶

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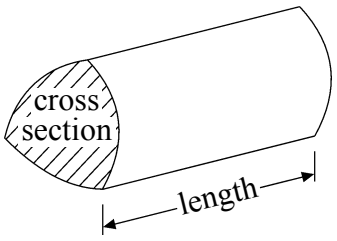
GCSE Mathematics 2AM01

Formulae: Higher Tier

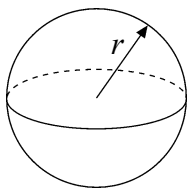
You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length



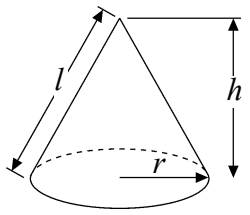
Volume of sphere $= \frac{4}{3}\pi r^3$

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

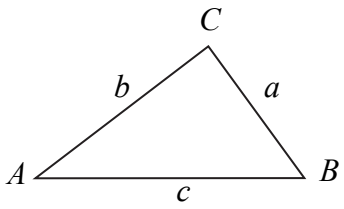


Volume of cone $= \frac{1}{3}\pi r^2 h$

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 questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Mark works at a garden centre.
He grows flowers from a packet of mixed seeds.
The seeds grow into flowers that are red or yellow or blue or white.

The table below shows each of the probabilities that a flower will be red or yellow or blue.

Colour	Red	Yellow	Blue	White
Probability	0.2	0.4	0.1	

(a) Work out the probability that the flower will be white.

.....

(2)

There are 200 seeds in the packet.

(b) Work out an estimate for the number of flowers that will be red.

.....

(2)

Mark has a watering system at the garden centre.
The watering system has a tank.
The diameter of the tank is d metres.
The height of the water in the tank is h metres.
The capacity, in litres, of the watering system is given by the formula $1000\left(\frac{\pi d^2 h}{6}+3\right)$

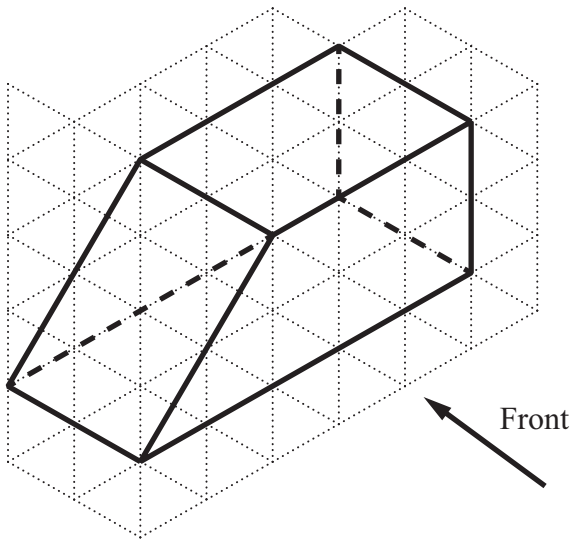
(c) Work out the capacity of the watering system when $d = 2.69$ and $h = 4.49$

..... litres

(2)

(Total for Question 1 is 6 marks)

2 The diagram below shows a prism drawn on a centimetre isometric grid.



(a) On the centimetre square grid, draw the front elevation of the prism from the direction marked by the arrow.

(2)

(b) On the centimetre square grid, draw a plan of the prism.

(2)

(c) Work out the volume of the prism.

..... cm^3

(3)

(Total for Question 2 is 7 marks)

3 Amy, Beth and Colin share sweets in the ratio 2 : 3 : 4
Colin gets 12 sweets more than Amy.

Work out the number of sweets each person gets.

Amy ..... sweets

Beth ..... sweets

Colin ..... sweets

(Total for Question 3 is 3 marks)

4 Barney needs to travel by plane from Aberdeen to Bristol.
He will have to fly to London first, then change planes.

Barney leaves on a plane from Aberdeen at 18 30
The plane arrives in London at 22 15

He then leaves on a plane from London at 23 15
It arrives in Bristol at 00 30

The distance from Aberdeen to Bristol via London is 600 km.

Calculate the average speed of the plane for the combined journey from Aberdeen to London, and from London to Bristol.

..... km/h

(Total for Question 4 is 5 marks)

5 There are some Year 7 students in a classroom.

18 of the students are girls.
12 of the students are boys.

The ratio of girls to boys in the classroom is the same as for the whole of Year 7
There are 135 girls in Year 7

(a) How many boys are there in Year 7?

.....

(2)

There is a total of 54 students in a choir.
There are five times as many girls as boys in the choir.

(b) Work out the number of girls in the choir.

.....

(2)

(Total for Question 5 is 4 marks)

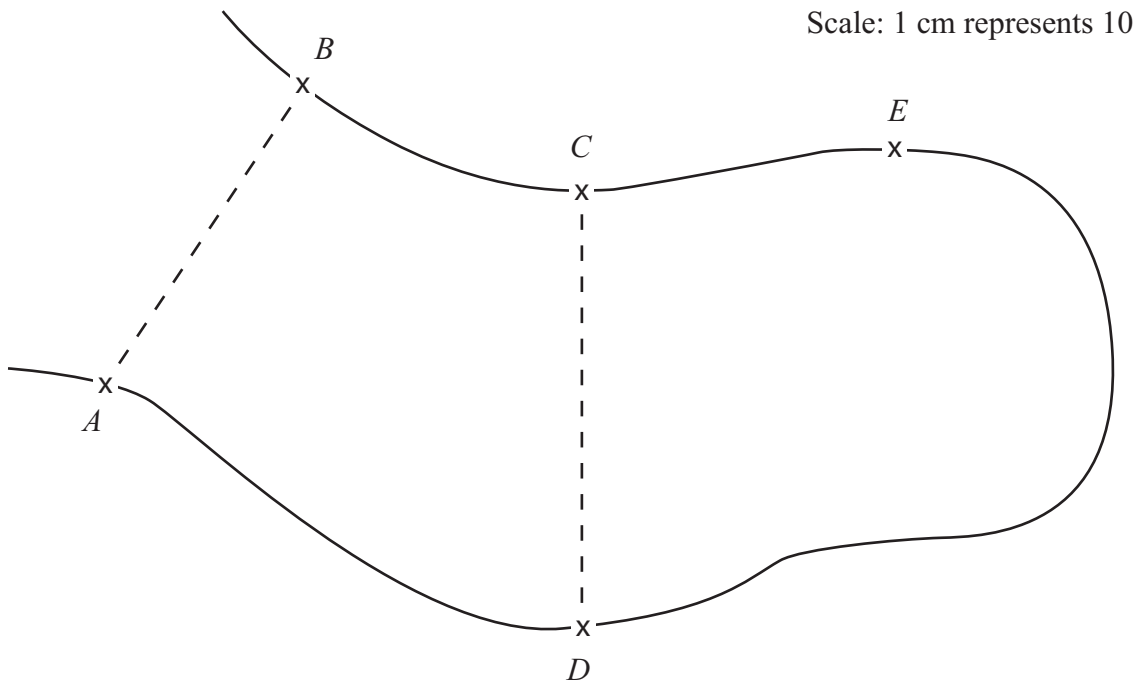
6 The map shows part of a lake.

In a competition for radio controlled boats, a competitor has to steer a boat so that

its path between *AB* and *CD* is a straight line
this path is always the same distance from *A* as from *B*

(a) On the map, draw the path the boat should take.

Scale: 1 cm represents 10 metres



(2)

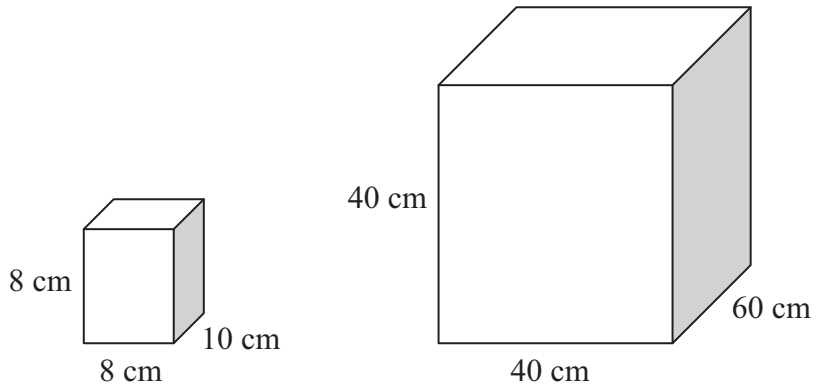
There is a practice region for competitors.
The practice region is that part of the lake that is less than 30 metres from point *E*.
The scale of the map is 1 cm represents 10 metres.

(b) Shade this practice region on the map.

(2)

(Total for Question 6 is 4 marks)

7



Small box Large box

Diagrams **NOT** accurately drawn

A small box measures 8 cm by 8 cm by 10 cm.
A large box measures 40 cm by 40 cm by 60 cm.

The large box is completely filled with small boxes.

Work out the number of small boxes in the large box.

.....

(Total for Question 7 is 4 marks)

8 Batteries are sold in packets and in boxes.

There are 4 batteries in each packet.
There are 20 batteries in each box.

Bill buys p packets of batteries, and b boxes of batteries.
Bill buys a total of N batteries.

Write down a formula for N in terms of p and b.

.....

(Total for Question 8 is 3 marks)

9 Here are the ingredients needed to make 500 m*l* of custard.

Custard
makes 500 m*l*
400 m*l* of milk
3 large egg yolks
50 g sugar
2 teaspoons of cornflower

Lu Yi is going to make 2000 m*l* of custard.

(a) Work out the amount of sugar he needs.

..... g
(2)

Yuki is going to make 750 m*l* of custard.

(b) Work out the amount of milk she needs.

..... m*l*
(2)

(Total for Question 9 is 4 marks)

10 A factory has 3 machines that make pieces of gutter of the same shape and size.
Each machine makes 150 pieces of gutter each hour.

The machines run from 9 am to 5 pm each day.
The machines will need to be run on overtime at other times.
The machines have to make 13 500 pieces of guttering for an urgent order.
The guttering is needed by 1pm on Thursday.

The machines start on Monday at 9 am.

For how many hours of overtime will each machine have to run so that the order is completed on time?

..... hours

(Total for Question 10 is 5 marks)

11 The diagram shows a wooden dowel for fastening two beams of wood.

The dowel is a solid cylinder.

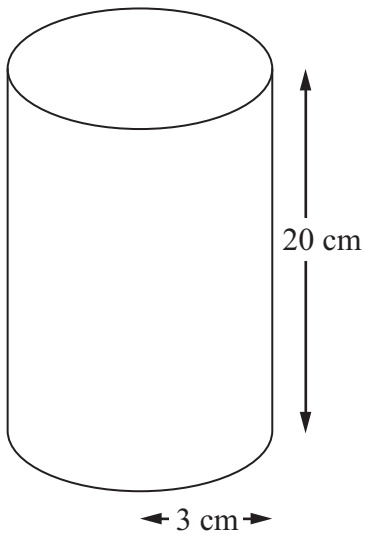


Diagram **NOT** accurately drawn

The dowel has a radius of 3 cm.
The dowel has a height of 20 cm.
The density of the wood is 0.6 grams per cm^3.

Work out the mass of the dowel.

..... grams

(Total for Question 11 is 3 marks)

12 A lighthouse, L, is 3.2 km due West of a port, P.
A ship S is 1.9 km due North of the lighthouse, L.

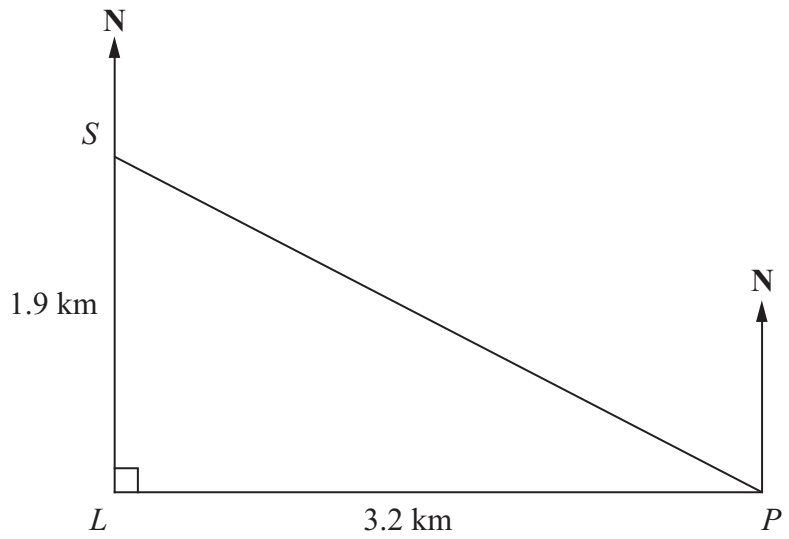


Diagram **NOT** accurately drawn

Find the bearing of P from S.
Give your answer correct to 3 significant figures.

.....°

(Total for Question 12 is 4 marks)

13 Midshire Couriers delivers packages.

On Monday, they delivered some packages.
On Tuesday, they delivered twice as many packages as on Monday.
On Wednesday, they delivered 20 more packages than on Tuesday.
On Thursday they delivered the same number of packages as on Monday.
On Friday they delivered 200 packages.

Midshire Couriers had a target to deliver more than 1000 packages from Monday to Friday.
This target was achieved.

What was the least number of packages that were delivered on Monday?

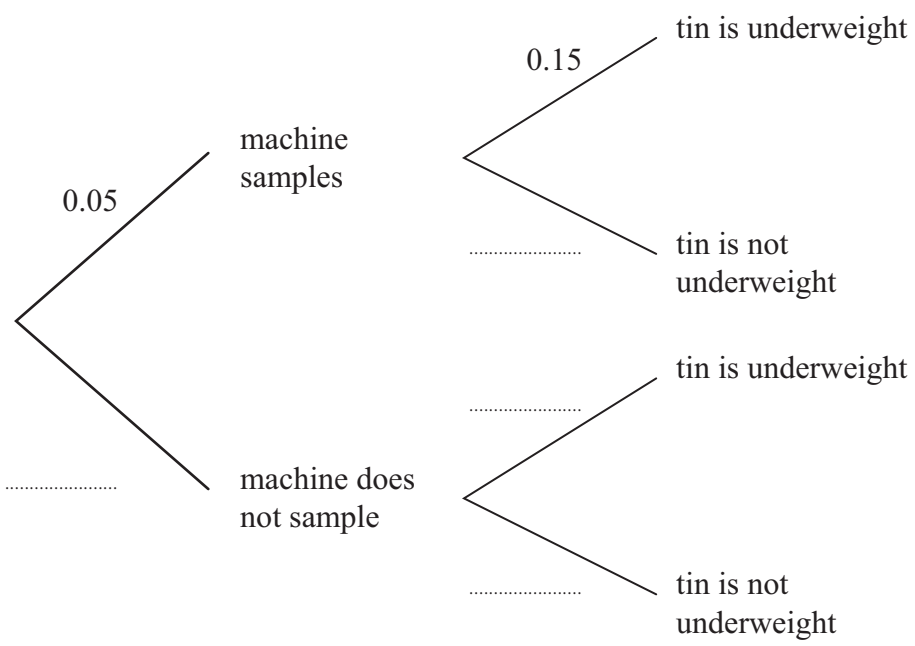
..... packages

(Total for Question 13 is 5 marks)

14 A company makes tins of baked beans.
Tins of baked beans should not be less than 200g in weight.
A machine, at random, samples tins of baked beans and weighs them.

The probability that a tin is sampled is 0.05
The probability that a tin is less than 200 g is 0.15

(a) Complete the decision tree diagram.



(2)

When a tin is sampled and found to be underweight the company will be fined.

(b) Work out the probability that the company will be fined.

.....

(2)

A different machine is used to sample soup tins.

The probability that a tin is sampled is p.
The probability that a tin is underweight is $p - 0.1$

(c) (i) Show that the probability of a soup tin being sampled and NOT being underweight is given by

$$1.1p - p^2$$

The company wants this probability to be 0.01

(ii) Use trial and improvement to find a value for p.
You must show all your working.
Give your answer correct to 3 decimal places.

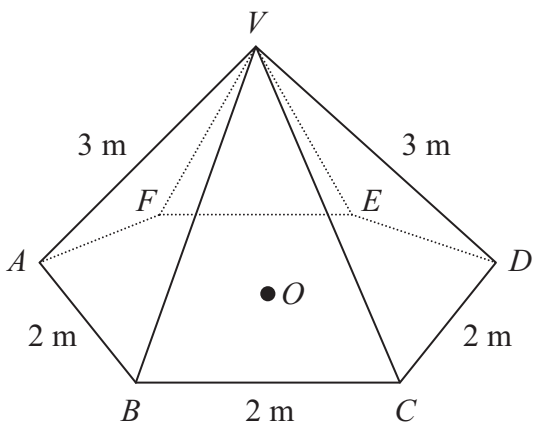
$p =$ .....

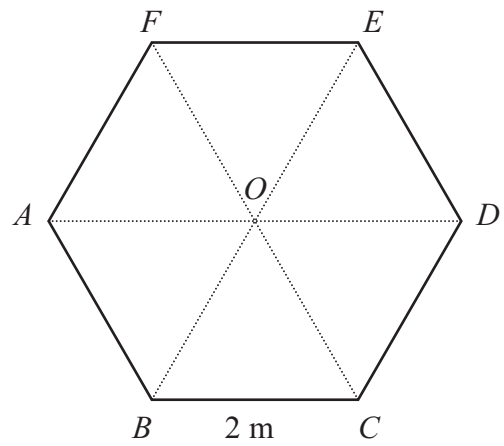
(7)

(Total for Question 14 is 11 marks)

15 The diagram shows a bell tent.
The vertex of the bell tent is V.

Diagram **NOT** accurately drawn





$AV = BV = CV = DV = EV = FE = 3$ m

The base of the tent is a regular hexagon with sides of length 2 m.
The area of the base of the tent is 10.4 m^2.
O is the centre of the base.

Calculate the volume of the tent.
Give your answer correct to 2 decimal places.

..... m^3

(Total for Question 15 is 4 marks)

16 The time, T seconds, that it takes a water heater to boil some water is directly proportional to the mass of water, m kg, in the water heater.

When $m = 250$, $T = 600$

(a) Find the value of T when $m = 400$

$T =$ .....

(3)

For a given mass of water, the time, T seconds, that it takes a water heater to boil the water is inversely proportional to the power, P watts, of the water heater.

When $P = 1400$, $T = 360$

(b) Find the value of T when $P = 900$

$T =$ .....

(3)

(Total for Question 16 is 6 marks)

17 Martinez runs a distance of 100 metres in a time of 10.52 seconds.

The distance of 100 metres was correct to the nearest metre.
The time of 10.52 seconds was correct to the nearest hundredth of a second.

(a) Calculate the upper bound for Martinez's average speed.

..... metres per second
(3)

(b) Calculate the lower bound for Martinez's average speed.

..... metres per second
(3)

(Total for Question 17 is 6 marks)

18 There are 3 strawberry yoghurts, 2 peach yoghurts, and 4 cherry yoghurts in a fridge.

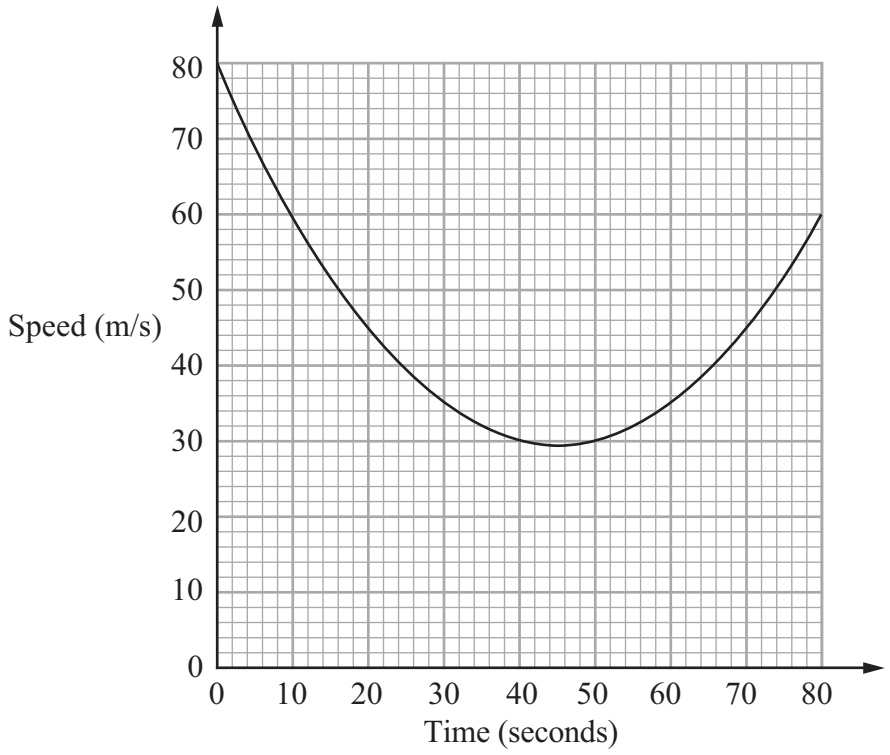
Amanda takes at random a yoghurt from the fridge.
She eats the yoghurt.
She then takes at random a second yoghurt from the fridge.

Work out the probability that both yoghurts taken were different flavours.

.....

(Total for Question 18 is 5 marks)

19 The graph represents the speed of an object as it slows down and then accelerates over a time of 80 seconds.



(a) Work out an estimate for the deceleration when the time is 20 seconds.

..... m/s^2

(3)

(b) Work out an estimate for the distance travelled in the 80 seconds.

..... m

(3)

(Total for Question 19 is 6 marks)

20 In 2008 the Cascades frog was discovered in the Klamath mountains of California.
It was estimated that the population of frogs was 546 in January 2008
It was estimated that the population of frogs was 813 in January 2010

Research suggested the population is increasing exponentially.
Research also suggested that a population greater than 1500 **cannot** be sustained by the local environment.

Assuming the same rate of increase, in which year is the frog population expected to exceed 1500?

.....

(Total for Question 20 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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