Write your name here

Surname		Other names

**Pearson
Edexcel GCSE**

Centre Number

Candidate Number

Applications of Mathematics
Unit 2: Applications 2
For Approved Pilot Centres ONLY

Higher Tier

Friday 8 November 2013 – Morning
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 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 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.

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 ▶

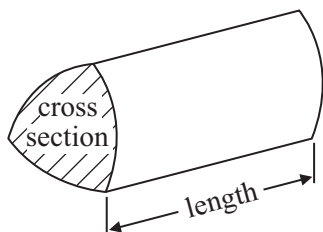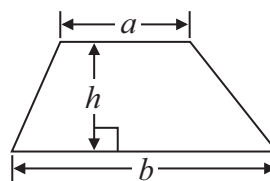**PEARSON**

Formulae: Higher Tier

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

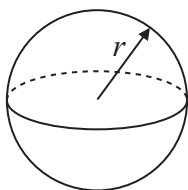**Volume of prism** = area of cross section × length

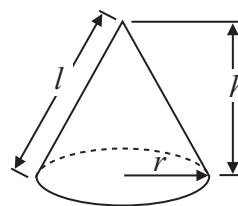**Area of trapezium** = $\frac{1}{2}(a + b)h$

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 = $\pi r l$

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 $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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.
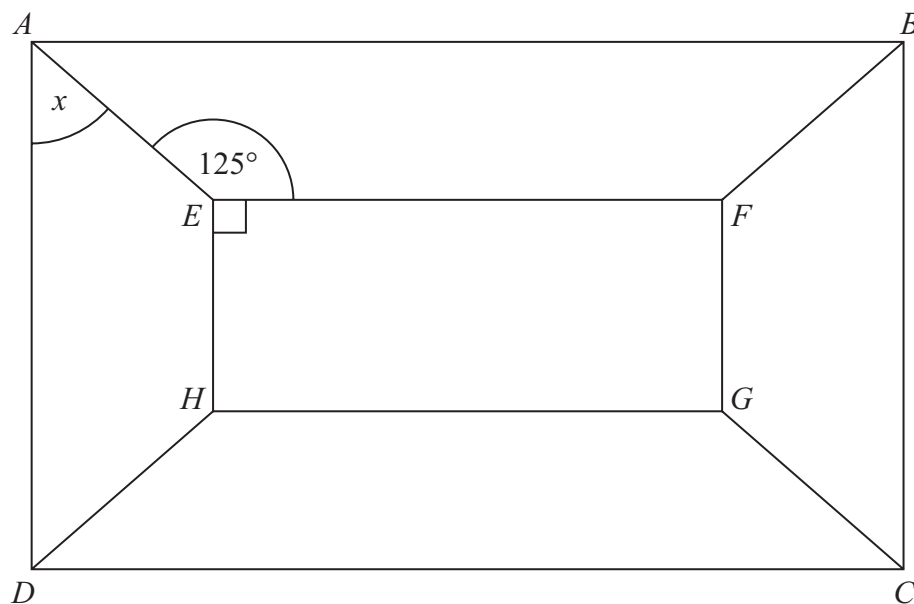
*1 Here is a picture frame.

Diagram **NOT** accurately drawn

ABCD and *EFGH* are rectangles.
AB is parallel to *EF*.

Work out the size of angle *x*.
You must give reasons for your answer.

(Total for Question 1 is 3 marks)

2 Blue paint, white paint and red paint are mixed together to make purple paint.

Here are the amounts of blue paint, white paint and red paint needed to make 12 pots of purple paint.

<div style="border:1px solid">

Purple Paint

800 m*l*   **blue paint**

500 m*l*   **white paint**

700 m*l*   **red paint**

Makes 12 pots

</div>

All the pots of purple paint are the same size.

Sarah works in a paint factory.
On Monday, she needs to make 27 pots of purple paint.

Work out the amount of blue paint, white paint and red paint Sarah needs.
Write your answers in the table below.

<div style="border:1px solid">

Purple Paint

.............m*l*   **blue paint**

..............m*l*   **white paint**

............m*l*   **red paint**

Makes 27 pots

</div>

(Total for Question 2 is 3 marks)

3 Tia works at a kennels for dogs.

She has 4 types of dog food to feed the dogs.
She takes, at random, a tin of dog food.

The table below shows the probabilities that Tia will take a tin of lamb dog food or a tin of beef dog food or a tin of chicken dog food.

Dog Food	lamb	beef	chicken	turkey
Probability	0.35	0.26	0.07	

(a) Work out the probability that Tia will take a tin of turkey dog food.

....

(2)

(b) Work out the probability that Tia will take a tin of chicken dog food or a tin of lamb dog food.

....

(2)

Tia has 500 tins of dog food.

(c) Work out the number of tins of lamb dog food she has.

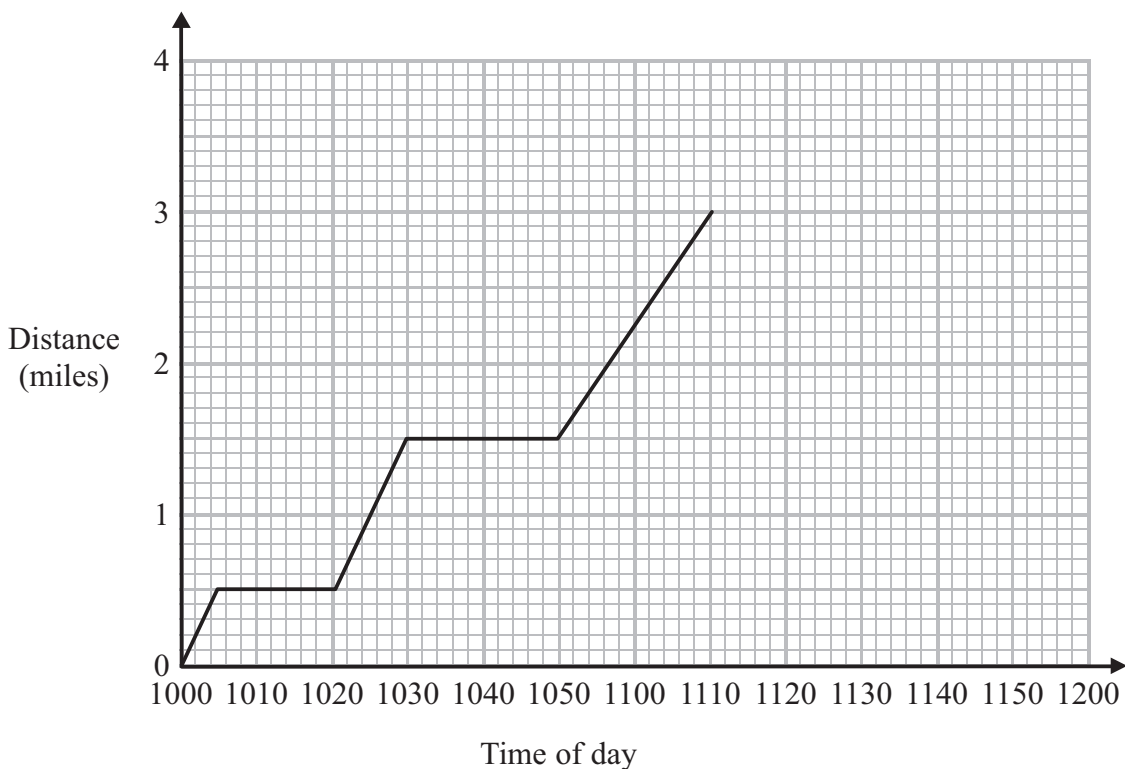...

(2)

(Total for Question 3 is 6 marks)

4 The Cooper family go to a Safari park by car.

Here is a travel graph for the first 3 miles of their drive through the Safari park.

(a) What time did the Cooper family start their drive through the Safari park?

....

(1)

The first time they stopped they watched the lions.

(b) How long did they watch the lions for?

.... minutes

(1)

The second time they stopped they watched the monkeys.

(c) Find the total distance they drove through the Safari park to the second time they stopped.

.... miles

(1)

The Cooper family then drove to see the elephants.

They stopped to watch the elephants at 1110
They watched the elephants for 10 minutes.

The family then drove to the end of the Safari park.
They got to the end of the Safari park at 1140

The family drove a total distance of 4 miles through the Safari park.

(d) Complete the travel graph.

(2)

(Total for Question 4 is 5 marks)

5 Sweets are sold in packets and in boxes.

There are 20 sweets in each packet.
There are 50 sweets in each box.

Claire buys p packets of sweets and b boxes of sweets.
Claire buys a total of T sweets.

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

....

(Total for Question 5 is 3 marks)

*6 A slice of wholemeal bread weighs 36 grams.
There are 84 calories in the slice.

A slice of white bread weighs 1.4 ounces.
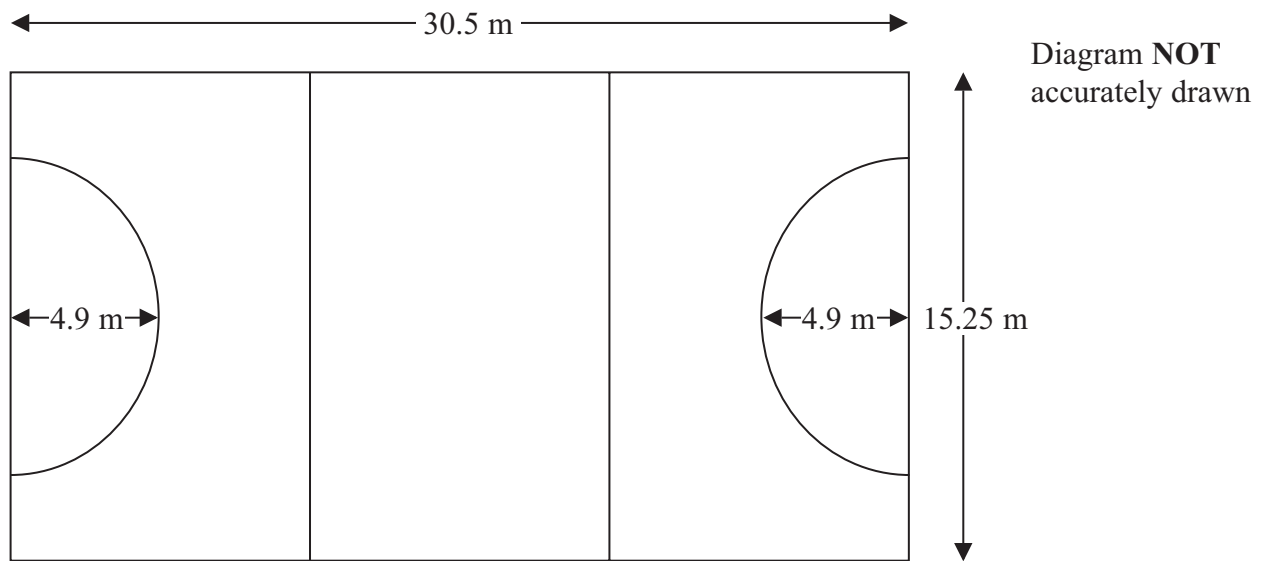There are 98 calories in the slice.

10 grams = 0.35 ounces.

Which slice of bread has more calories per gram?

(Total for Question 6 is 4 marks)

7 The diagram shows the lines of a netball court.

Diagram **NOT** accurately drawn

The court is made from three rectangles and two semi-circles.

All the corners are right angles.

Mr Handy is painting the lines for the netball court on the floor of a school sports hall.

Work out the total length of the lines of the netball court.
Give your answer correct to the nearest metre.

.... m

(Total for Question 7 is 4 marks)

8 Jennifer wins £4560

She shares the money between a charity, herself and her son in the ratio 2 : 7 : 3

Work out how much money Jennifer gives to the charity.

£ ....

(Total for Question 8 is 3 marks)

9 Stephen throws a ball vertically downwards.

The distance, x, which the ball travels, is given by the formula $\quad x = \dfrac{v^2 - u^2}{19.6}$

$v = 14.3$
$u = 6.2$

Work out the value of x.
Give your answer correct to 1 decimal place.

$x = $ ....

(Total for Question 9 is 2 marks)

10 Frank makes wooden blocks.
The wooden blocks are cuboids.

The diagram shows one of the wooden blocks.

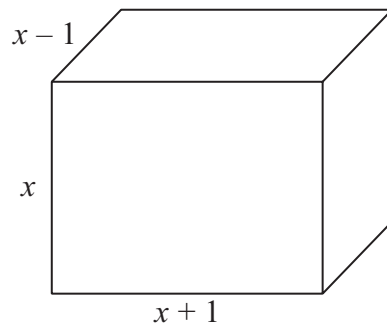

Diagram **NOT**
accurately drawn

All measurements are in centimetres.

The cuboid has a volume of 16 cm³.

(a) Show that $x^3 - x = 16$

(2)

(b) Use trial and improvement to find the value of x.
You must show **all** your working.
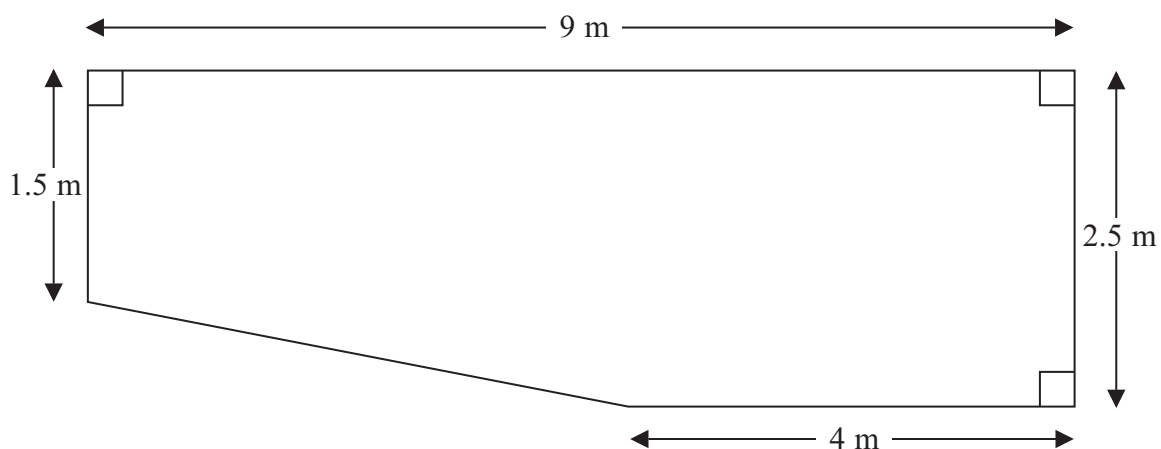Give your answer correct to 1 decimal place.

$x = $ ....

(4)

(Total for Question 10 is 6 marks)

11 The diagram shows the cross-section of a swimming pool.

Diagram **NOT**
accurately drawn
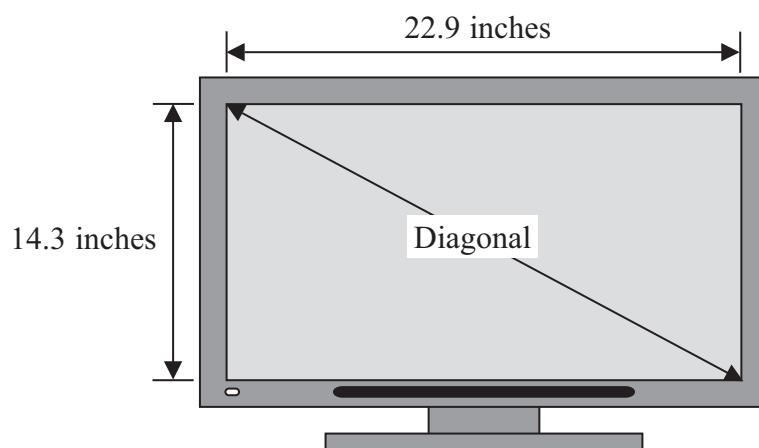

The pool is a prism.
The width of the pool is 5 m.

Calculate the volume of water needed to fill the swimming pool.

.... m^3

(Total for Question 11 is 4 marks)

12 Here is a picture of a television.

22.9 inches

14.3 inches

Diagonal

The television screen is a rectangle.

The size of a television screen is the length of a diagonal of the screen.

Calculate the size of the television screen.
Give your answer to the nearest inch.

.... inch

(Total for Question 12 is 4 marks)

*13 When you know the length of an adult's foot (*i*) in inches, you can use the formula

$$S = 3i - 25$$

to calculate their UK shoe size (*S*).

When you know an adult's UK shoe size (*S*), you can use the formula

$$E = S + 33$$

to calculate their European shoe size (*E*).

Tamsin is buying some shoes as a present for her friend Jane.

Jane is an adult with a foot length of 11 inches.

Tamsin orders some shoes.
The shoes are European size 38

Will the shoes fit Jane?
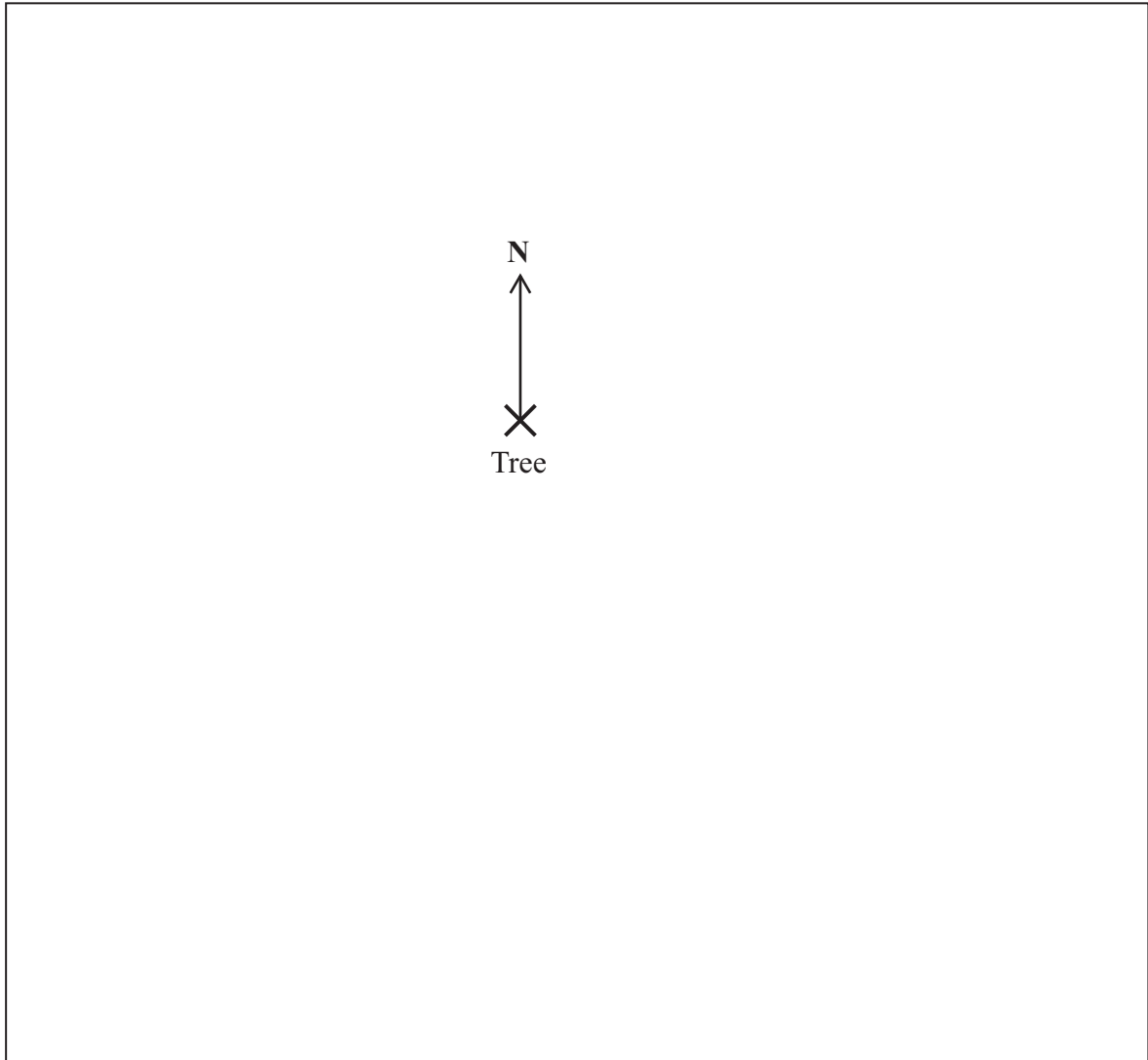You must show all your working.

(Total for Question 13 is 3 marks)

14 Here is a clue to find some treasure.

You will find the treasure 7.5 m from the tree on a bearing of 125°

Scale: 1 cm represents 1.5 m

Draw an accurate diagram to show the position of the treasure.
Mark the position of the treasure with a cross (×). Label it *T*.

(Total for Question 14 is 2 marks)

15 Malcolm knows he eats too many biscuits.
He wants to eat less than 30 biscuits a week.

On Monday, Malcolm ate some biscuits.
On Tuesday, he ate half as many biscuits as on Monday.
On Wednesday, he ate five biscuits less than on Tuesday.
On Thursday, he ate 9 biscuits.
On Friday, Saturday and Sunday he ate no biscuits.

Malcolm ate less than 30 biscuits from Monday to Sunday.

What is the biggest number of biscuits Malcolm could have eaten on Monday?
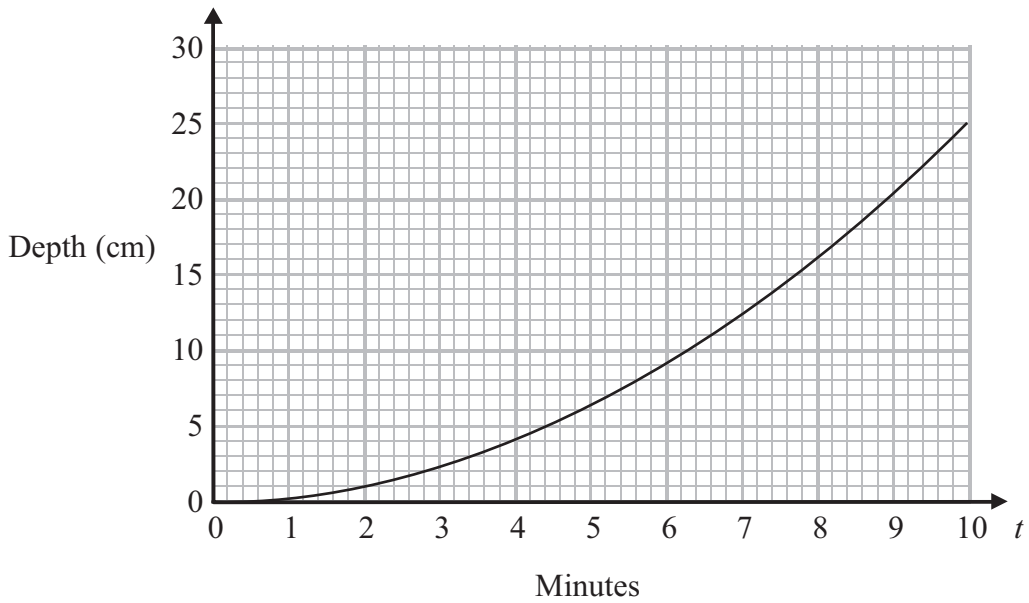
.... biscuits

(Total for Question 15 is 4 marks)

16 Mrs Wilson is filling a bath.

The graph below shows the depth, in centimetres, of water in the bath after t minutes.

(a) Work out an estimate for the rate of change of the depth of water at $t = 6$

.... cm / min

(3)

(b) Work out the average rate of change in the depth of the water from $t = 3$ to $t = 8$

.... cm / min

(2)

(Total for Question 16 is 5 marks)

17 A boat delivers food to an oil rig R, and a lighthouse L.

The boat sails in a straight line from the harbour H, to the oil rig.
The oil rig is 8 km from the harbour and on a bearing of 070° from the harbour.

The boat then sails due south to the lighthouse.

The boat then sails back to the harbour in a straight line.
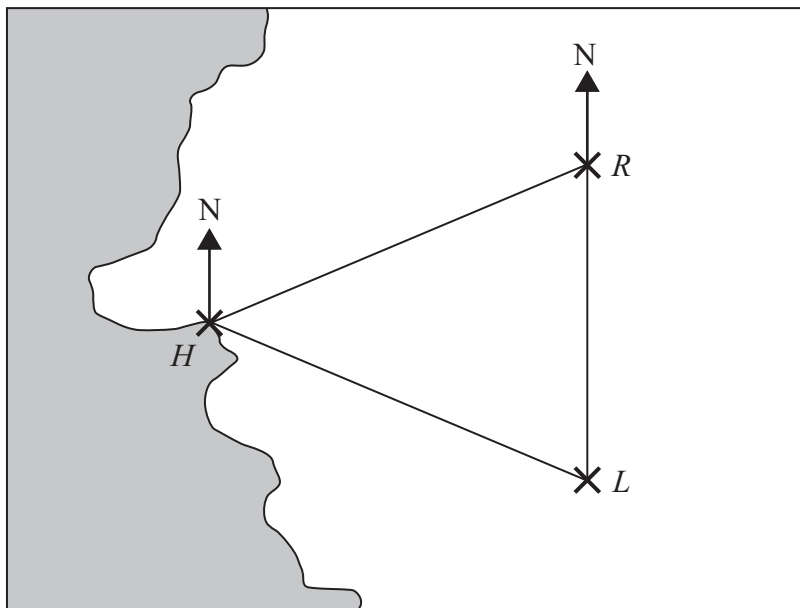The harbour is 8 km from the lighthouse.

Diagram **NOT**
accurately drawn

Calculate the total distance the boat sails.
Give your answer to 3 significant figures.

.... km

(Total for Question 17 is 4 marks)

18 Jeremy is driving on a motorway.

He drives on the motorway for 99.7 miles, correct to 1 decimal place.
He drives at an average speed of 67 miles per hour, correct to 2 significant figures.

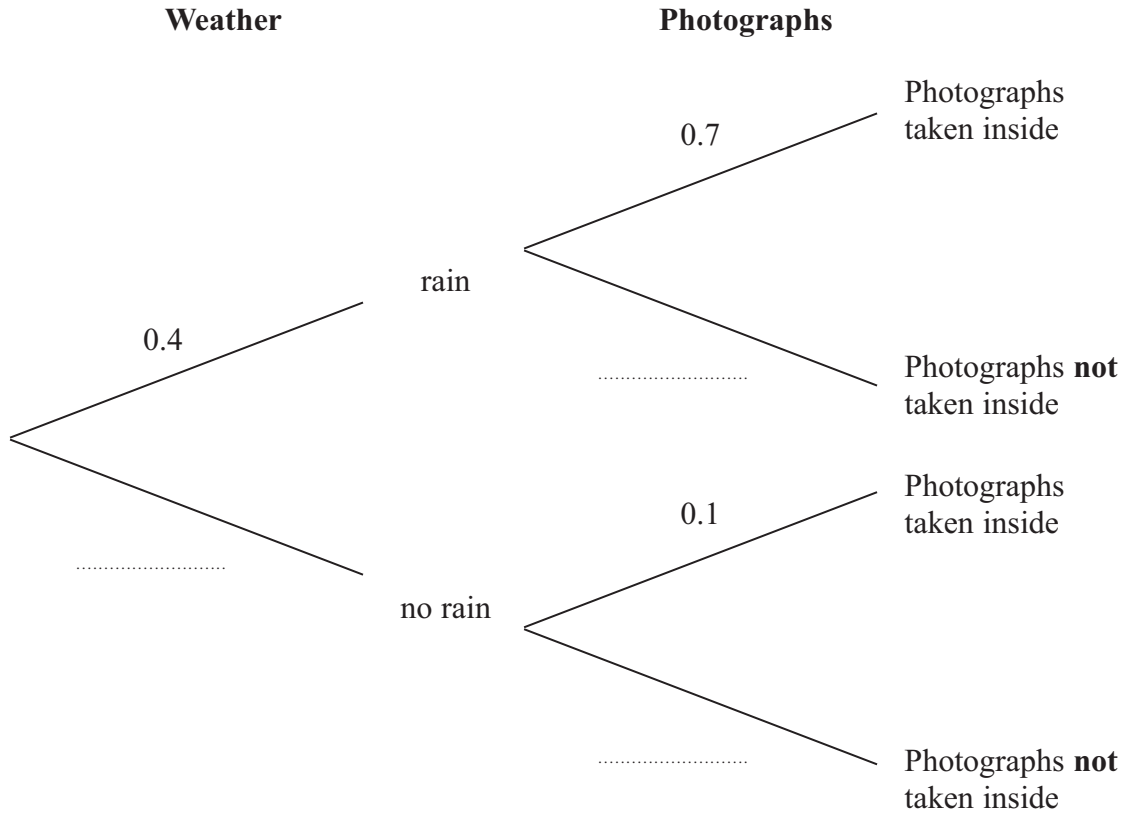Calculate the upper bound of the time Jeremy is driving on the motorway.

.... hours

(Total for Question 18 is 4 marks)

19 Amira is getting married in a hotel on a Saturday.

If it rains on the Saturday, the photographs might need to be taken inside the hotel.

The decision tree diagram gives information about the probability of it raining on the Saturday and the probabilities that the photographs will need to be taken inside the hotel.

Weather   **Photographs**

```
                                                        Photographs
                                          0.7           taken inside

                              rain
         0.4
                                          ...........   Photographs not
                                                        taken inside


                                          0.1           Photographs
                                                        taken inside
         ...........
                              no rain

                                          ...........   Photographs not
                                                        taken inside
```

(a) Complete the decision tree diagram.

(2)

The hotel has two rooms for hire, a basic room and a luxury room.

If the risk of the photographs needing to be taken inside is greater than 0.5, Amira will hire the luxury room.

*(b) Will Amira need to hire the luxury room?

(4)

(Total for Question 19 is 6 marks)
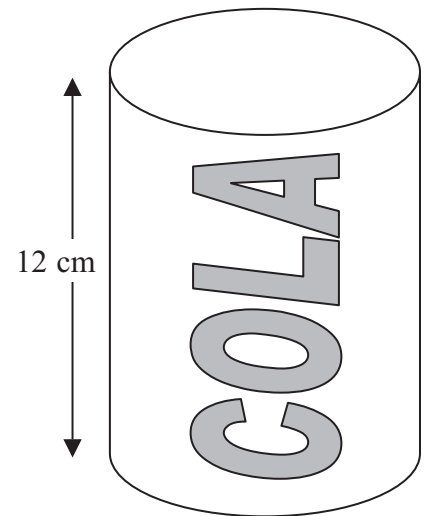
20 A company makes cola drinks.

The company is designing a doll for an advert for the cola.
The company wants the doll to hold a can of cola.

A real can of cola and the doll's can of cola are similar cylinders.

A real can of cola has a radius of 3.2 cm and a height of 12 cm.
The doll's can of cola has a volume of 48.25 cm³.

Work out the height of the doll's can of cola.

Diagram **NOT**
accurately drawn

12 cm

.... cm

(Total for Question 20 is 5 marks)

21 There are only

        4 mint biscuits
     and 1 toffee biscuit in a tin.

There are only

        5 mint sweets
     and 3 strawberry sweets in a packet.

Michael's mum lets him take one biscuit from the tin and one sweet from the packet.

Michael takes a biscuit at random from the tin.
He also takes a sweet at random from the packet.

Work out the probability that either the biscuit is mint or the sweet is mint, but not both.

....

(Total for Question 21 is 3 marks)

22 In the winter a farmer feeds his cows with hay each day.

The number of days, d, the hay will last is inversely proportional to the number of cows, c, the farmer has.

The farmer has enough hay to feed 280 cows for 25 days.
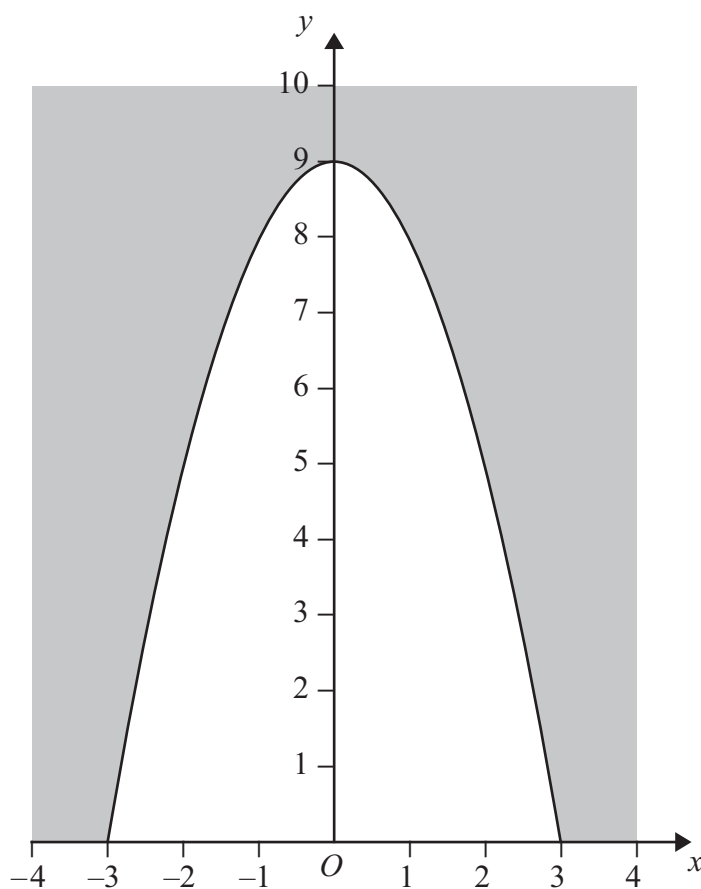
(a) Find a formula for d in terms of c.

....

(2)

The farmer has 350 cows.

(b) How many days will the farmer be able to feed all his cows with hay?

.... days

(2)

(Total for Question 22 is 4 marks)

23 Here is a sketch of the graph of $y = 9 - x^2$

The graph is used to model the cross section of a tunnel.
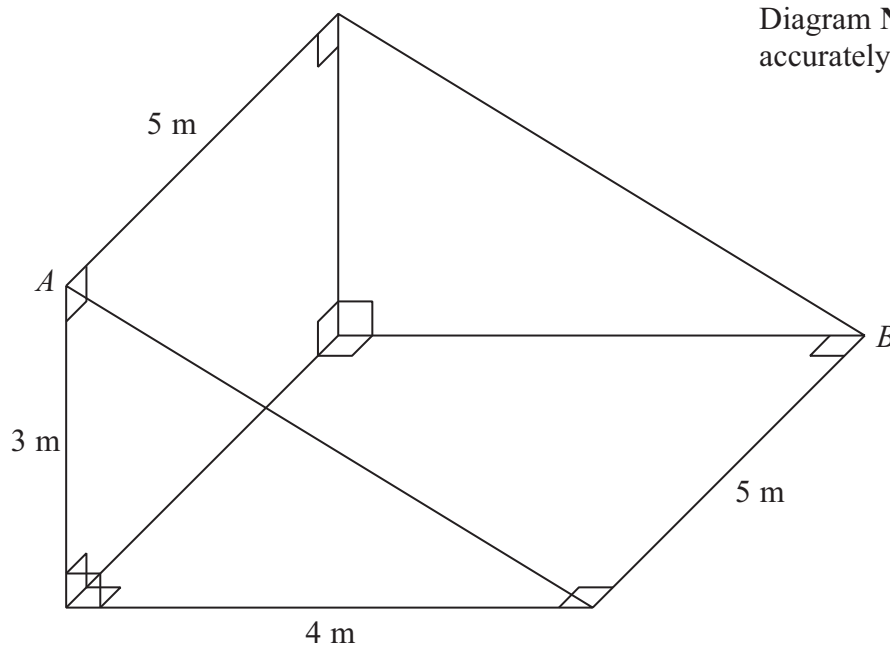The unshaded area is the cross section of the tunnel.

Calculate an estimate of the area of the cross section of the tunnel.

....

(Total for Question 23 is 4 marks)

*24 Here is a diagram of a room in Sanjay's house.

Diagram **NOT** accurately drawn

5 m

A

3 m

4 m

5 m

B

Sanjay is putting an electric cable across the ceiling of the room.
The cable will start from *A* and go to *B*.

Calculate the shortest possible length of the cable.
Give your answer to 3 significant figures.
You must show all your working.

(Total for Question 24 is 4 marks)

25 A scientist is studying some rabbits.
The rabbits have a disease that kills the rabbits.

A population of 160 of these rabbits was reduced to 90 rabbits in two days.

The rabbit population is decreasing exponentially.

Work out how many of the 160 rabbits will still be alive at the end of 7 days.

....

(Total for Question 25 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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