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F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

APPLICATIONS OF MATHEMATICS

A382/01

Applications of Mathematics 2 (Foundation Tier)

A315600611

Candidates answer on the question paper.

OCR supplied materials:
None

Other materials required:
- Scientific or graphical calculator
- Geometrical instruments
- Tracing paper (optional)

Friday 10 June 2011
Morning

Duration: 1 hour 30 minutes

A382201

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

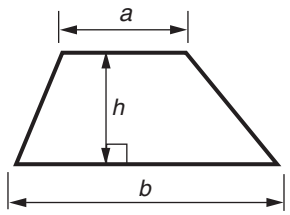
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*****).
- The total number of marks for this paper is **90**.
- This document consists of **28** pages. Any blank pages are indicated.

You are permitted to use a calculator for this paper

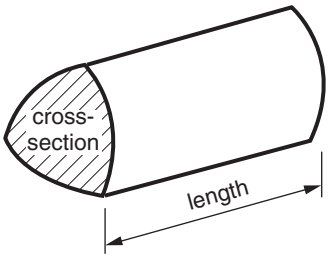
This paper has been pre modified for carrier language

Formulae Sheet: Foundation Tier

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



Volume of prism = (area of cross-section) × length



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1 Before 1971, people in Britain used these coins:

shilling

penny

The symbol for an old penny was d.

An old penny was worth less than the penny (p) that we use now.

The conversion table shows some amounts in old money, and their value in money that we use now.

Old money	Value in money that we use now
6d	$2\frac{1}{2}$p
1 shilling	5p
2 shillings	10p
10 shillings	50p

(a) What is the value of 15 shillings in money that we use now?

(a) _____ p **[1]**

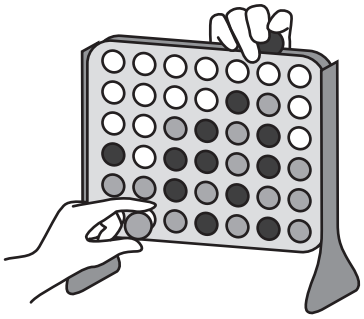
(b) What is the value of 15p in old money?

(b) _____ **[2]**

(c) In 1960, one pint of milk cost 9d.

What would this price be in money that we use now?
Give your answer to the nearest p.

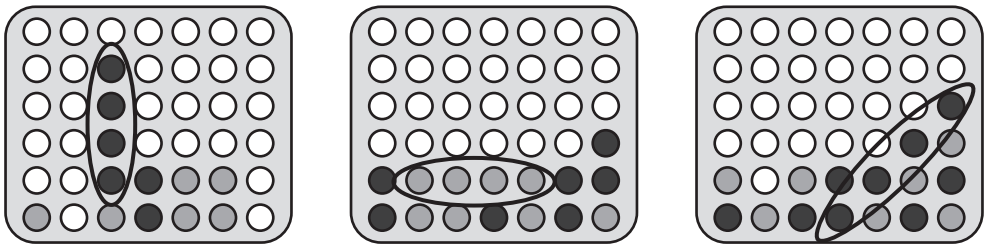
(c) _____ p **[2]**



2 The game of *Connect Four* is for two players.
Each player uses counters of one colour.
They take turns to drop their counters into a frame.

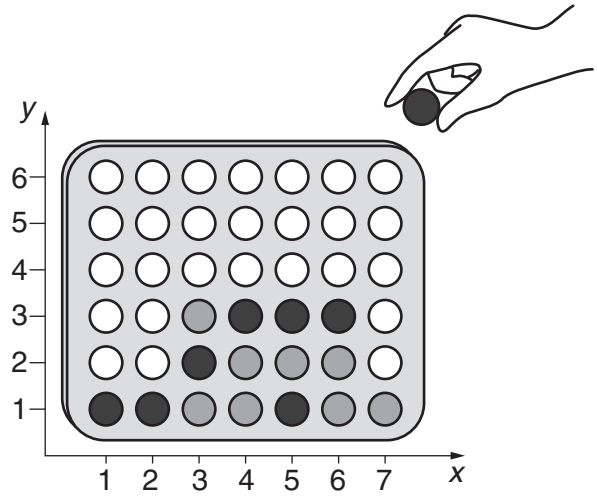
Each new counter falls through the frame until it lands on the counter below it.

To win, a player must get four counters of their own colour next to each other in a straight line.
A winning line of counters can be vertical, horizontal or diagonal.



(a) Tom and Jan are playing *Connect Four*.
It is Tom's turn next. His counters are black.
He is going to drop his counter in at the top of the frame.
It will fall down until it lands on the counter below it.

(i) Where should Tom's counter land to win?
Shade in this position on the diagram.



[1]

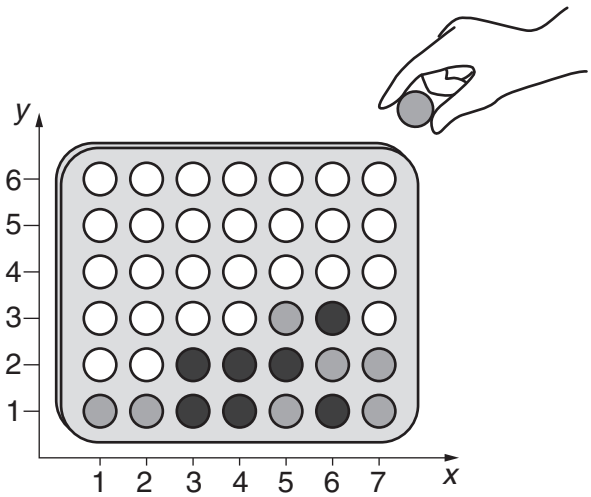
(ii) What are the coordinates of this position?

(a)(ii) (_____ , _____) **[1]**

(b) Tom and Jan play a new game of *Connect Four*.
It is Jan's turn next. Her counters are grey.

Jan wants to stop Tom from making a winning line with his black counters.

(i) Where should Jan's counter land to stop Tom winning?
Shade in this position on the diagram.



[1]

(ii) What are the coordinates of this position?

(b)(ii) (_____ , _____) **[1]**

3 The table shows how many hours Anna worked each day one week.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Hours worked	2	$2\frac{1}{2}$	4	$4\frac{1}{2}$	3

Anna earns the same amount for each hour that she works.
On Monday Anna worked 2 hours and earned £15.30.

How much did she earn in the whole week?

£ _____ **[3]**

4 This map shows six cities in the UK.

The chart shows the distances by road, in miles, between the cities.

It shows that the distance from Cardiff to Leeds is 226 miles.

Aberdeen	Cardiff	Glasgow	Leeds	Newcastle	Plymouth
505					
148	384				
316	226	208			
230	312	153	96		
589	159	49	323	412	

(a) (i) One of the distances in the chart is wrong.

Put a ring around the distance that must be wrong. **[1]**

(ii) Explain how you can tell from the map that this distance must be wrong.

_____

_____ **[1]**

(b) What is the distance between the two cities that are furthest apart?

(b) _____ miles **[1]**

(c) (i) Rita drives from Glasgow to Newcastle, and then on to Cardiff.

How far does she drive altogether?

(c)(i) _____ miles **[2]**

(ii) Rita's car uses 1 litre of petrol to travel 12 miles.

How much petrol does Rita use on her journey?

(ii) _____ litres **[1]**

(d) Here are four journeys.

Journey 1	**Journey 2**	**Journey 3**	**Journey 4**
Plymouth to Leeds, and then back to Plymouth.	Plymouth to Leeds, and then on to Glasgow.	Leeds to Plymouth, and then on to Cardiff.	Leeds to Plymouth, and then on to Newcastle.

(i) Henri says,

"You can work out which journey is the longest without adding anything up."

Is Henri correct? Put a ring around 'Yes' or 'No'.

Yes **No**

Give a reason for your answer.

_____

_____ **[1]**

(ii) Put the four journeys in order of distance, longest first.

Journey _____ , Journey _____ , Journey _____ , Journey _____

longest *shortest*

[3]

5 The calendar that we normally use is called the Gregorian Calendar.
People in some places use the Islamic Calendar.
The Gregorian year is longer than the Islamic year.

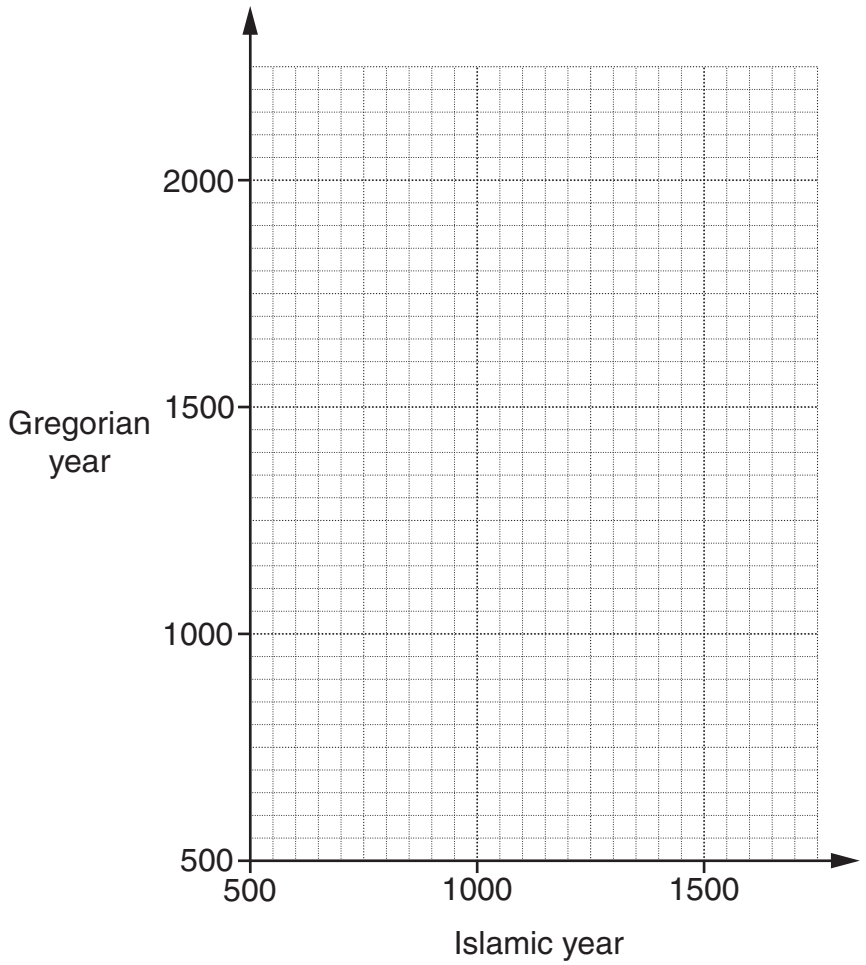
The table shows some information about Islamic and Gregorian years.

Islamic year	500	1000	1500
Gregorian year	1106	1591	2076

(a) Work out how many Gregorian years there are in one thousand Islamic years.

(a) _____ Gregorian years **[1]**

(b) (i) Draw a graph to map the years from 500 to 1500 of the Islamic Calendar onto the years of the Gregorian Calendar.

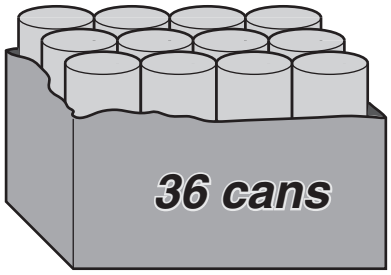


[2]

(ii) What **Islamic** year is equivalent to the **Gregorian** year 1400?

(b)(ii) _____ **[1]**

6 **(a)** There are 36 cans in this carton.
There are the same number of cans in each layer.



How many layers of cans are there in the carton?

(a) _____ layers **[1]**

(b) There are 60 cans in a different carton.
There are the same number of cans in each layer.

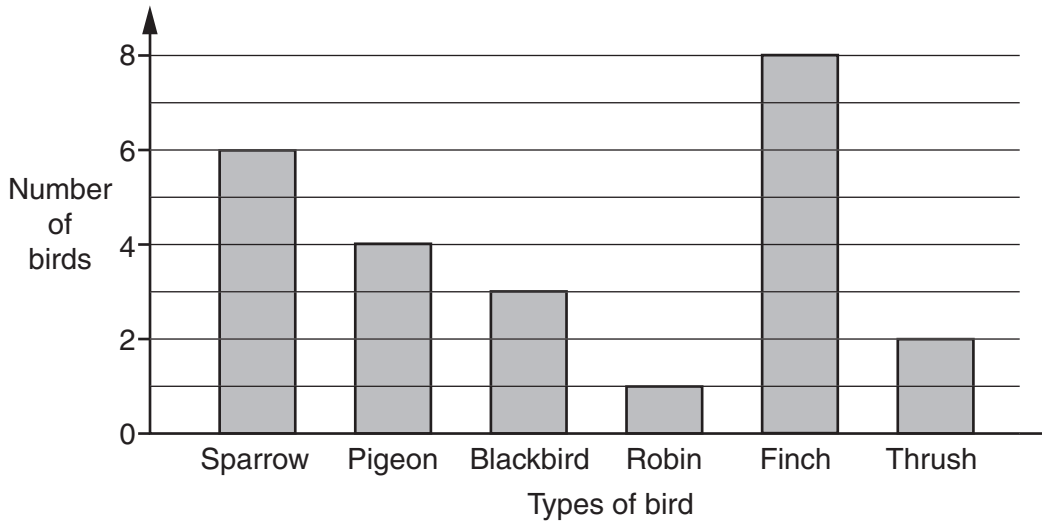
How many layers could there be in this carton, and how many cans would there be in each layer?
Give three different possible answers.

_____ layers, with _____ cans in each layer

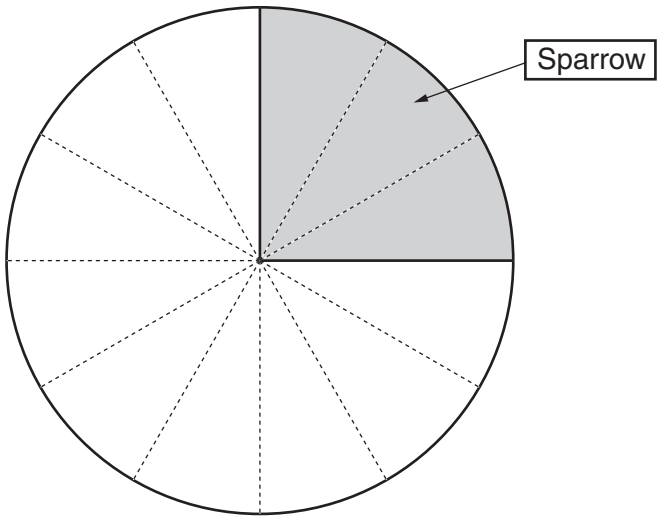
_____ layers, with _____ cans in each layer

_____ layers, with _____ cans in each layer **[2]**

7 Mike recorded the number of visits made by different types of bird to the bird table at his school. This bar chart summarises his results.



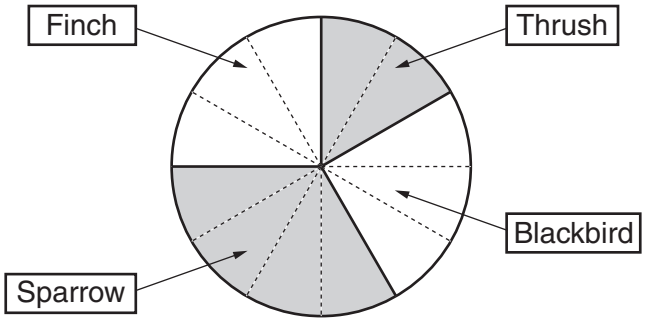
(a) Complete this pie chart to show the same information.
Remember to label each section of your pie chart.



[3]

(b) Yola recorded the number of visits made by different types of bird to the bird table at her school.

She showed her results in a pie chart.



Ben says:

"There were more visits from sparrows to the bird table at Yola's school than to the bird table at Mike's school."

Is Ben correct? Put a ring around 'Yes', 'No' or 'Cannot tell'.

Yes **No** **Cannot tell**

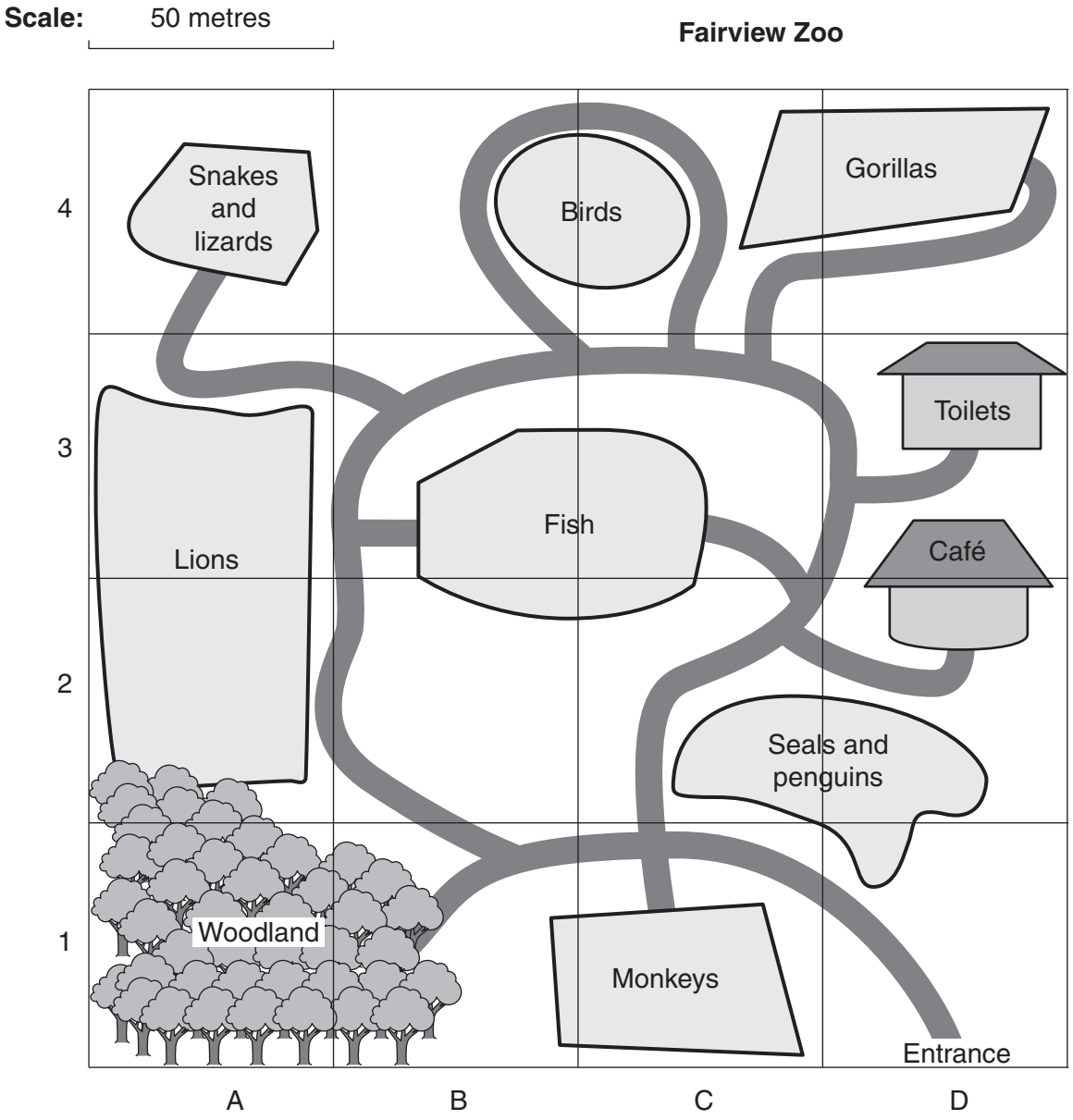
Give a reason for your answer.

_____

_____

_____ **[1]**

8 This is the plan of a zoo.



(a) There is a water tap at the exact centre of square B2.

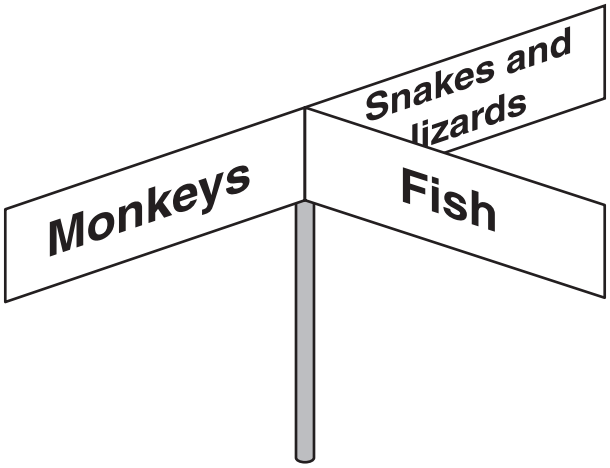
Mark the position of the water tap with a cross. **[1]**

(b) Shazia is standing on a path in square B2.
She is looking at the Lions.
What is on her left?

(b) _____ **[1]**

(c) This signpost is at a place where two paths meet.

Mark the position of the signpost with a cross.



[1]

(d) Each square shown on the plan represents a square with sides 50 metres.

Estimate the area of the Woodland.
Give your answer correct to the nearest 100 m^2.

(d) _____ m^2 **[3]**

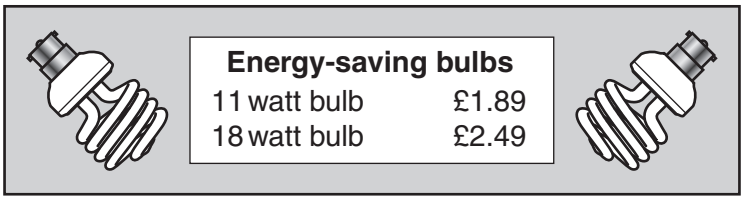
9 The power used by light bulbs is measured in watts.
Energy-saving bulbs cost less to run than old bulbs because they use fewer watts.

The table shows the number of watts used by an old bulb, and the number of watts used by an energy-saving bulb that gives the same amount of light.

Old bulb	Energy-saving bulb
60 watt	11 watt
100 watt	18 watt

(a) The Lee family have three 60 watt and four 100 watt old bulbs in their flat.

They replace all their old bulbs with energy-saving bulbs that give the same amount of light.



What is the total cost of their energy-saving bulbs?

(a) £ _____ **[2]**

The table shows the average cost of using an old bulb and an energy-saving bulb for one year.

Cost of using			
Old bulb		**Energy-saving bulb**	
60 watt	£14.24	11 watt	£2.85
100 watt	£23.73	18 watt	£4.75

(b)* How much money will the Lee family save by buying the energy-saving bulbs and using them for one year?
Show clearly how you get your answer.

_____

_____

_____

_____

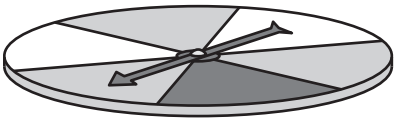
_____

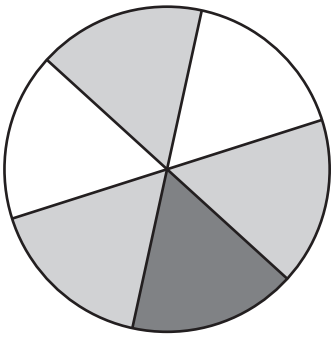
_____

_____

_____ **[4]**

10 (a) (i) Leo has a fair spinner that is divided into 6 equal sectors.
The sectors are white, grey and black.



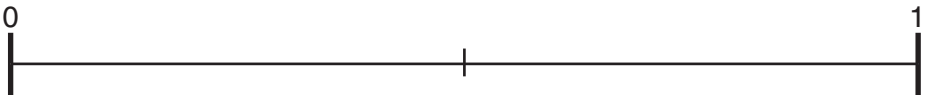


Leo spins the pointer.

What is the probability that it will stop on a white sector?

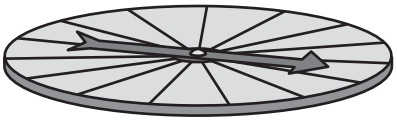
(a)(i) _____ **[1]**

(ii) Put a cross on the probability scale to represent this probability.

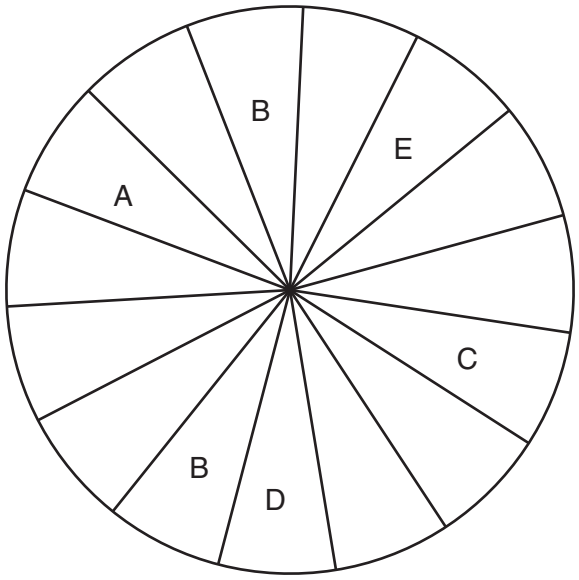


[1]

(b) Yu Lin has a fair spinner that is divided into 15 equal sectors.



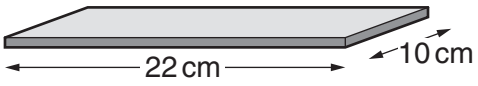
Some of the sectors are shown labelled with letters.



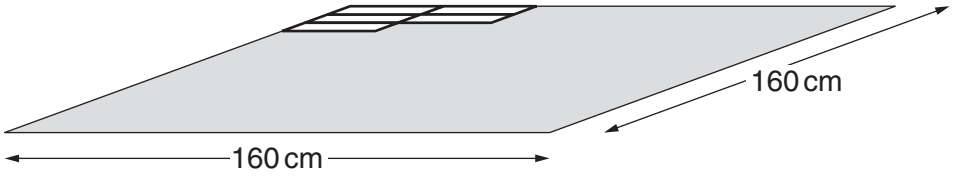
Write one letter in each of the empty sectors so that **all** of the following statements are true.

- The probability that the pointer stops on C is $\frac{4}{15}$
- The pointer is twice as likely to stop on C than on D
- The pointer is equally likely to stop on A, B or E **[4]**

11 Katie has a lot of tiles like this.



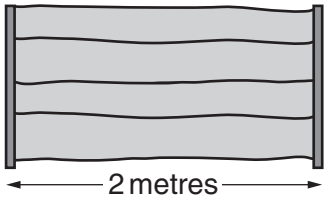
She lays them on a square board with edge length 160 cm.
She lays all the tiles the same way round, as shown in the diagram.
The tiles do not stick out over the edges of the board.



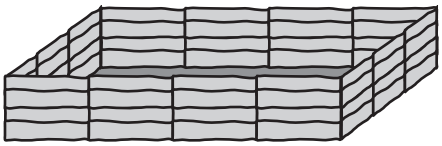
What is the greatest number of tiles that will fit onto the board?

_____ tiles **[4]**

12 Maria has some fence panels which are 2 metres long.



She surrounds a rectangular patch of grass 4 panels long and 3 panels wide.



(a) What is the total length of these fence panels?

(a) _____ m **[1]**

(b) Maria puts a wire fence diagonally across the patch of grass.

Calculate the length of the wire fence.

(b) _____ m **[3]**

13 A group of 15 boys joined their local swimming club.
Their trainer recorded how long they took to swim 50 m freestyle.
The stem and leaf diagram shows their times.

5	3 4 7 9
6	2 2 2 5 7 9
7	5 8 9
8	1 3

Key: 8 | 1 represents 81 seconds

(a) Complete this table for these times.

Time taken by the fastest swimmer:	_____ seconds
Range:	_____ seconds
Median:	_____ seconds

[3]

(b) The 15 boys trained for ten weeks. Their trainer then recorded how long they took to swim 50 m freestyle. These times are summarised below.

Time taken by the fastest swimmer	50 seconds
Range	30 seconds
Median	62 seconds

(i) After training, what was the time taken by the slowest swimmer?

(b)(i) _____ s **[1]**

(ii) Write down two comparisons between the boys' times before and after training.

(1) _____

_____

(2) _____

_____ **[2]**

(iii) Did all of the boys' times improve after the training?
Explain your answer.

_____

_____ **[1]**

14 A situation can be represented by an inequality.
For example:

Situation	n =	Inequality
Bananas cost 20p each. I have at least enough money to buy 4 bananas, but not enough to buy 5.	Amount of money I have in pence	$\mathbf{80 \leqslant n < 100}$

(a) Write an inequality for this situation.

Situation	n =	Inequality
11 people are coming to a meeting. There are more than enough biscuits for everyone to have 2 each, but not enough for 3 each.	Number of biscuits	

[2]

(b)* Write a situation to match this inequality: $\boldsymbol{n < 10}$
Say what $\boldsymbol{n}$ represents in your situation.

_____

_____

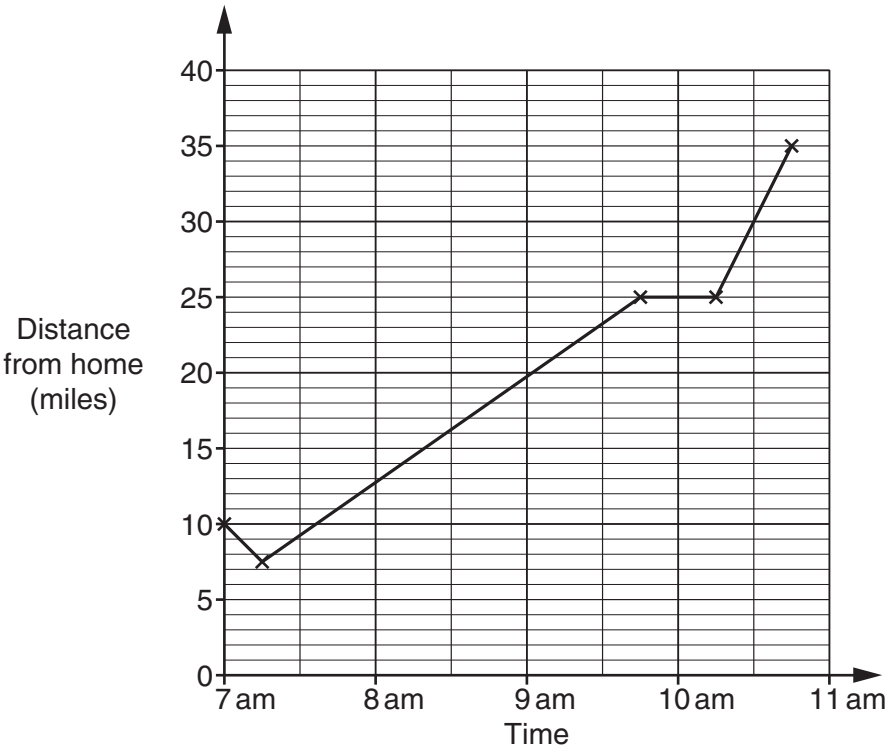
_____

_____

_____ **[2]**

15 Josh took part in a 'shopfront to seafront' cycling event with his local club.
He started outside the cycle shop at 7 am and finished at the sea front at 10:45 am.

The graph shows Josh's distance **from home** during the event.



(a) Josh stopped during the event.

For how long did he stop?

(a) _____ minutes **[1]**

(b) How many miles did Josh cycle during the event?

(b) _____ miles **[2]**

(c) Between which two times did Josh cycle at his greatest speed?
Explain how you decided.

_____ because _____

_____ **[2]**

16 Sarah is an Australian shopping in London.
She has some Australian dollars (AU$).
She wants to buy this handbag.
The price of the handbag is given in pounds and in euros.

Sarah can change her Australian dollars (AU$) at the following rates.

AU$1 = £0.611
AU$1 = €0.713

Which currency represents the lower price for the handbag?
Show calculations to support your answer.

_____

_____

_____

_____

_____

_____

_____

_____

_____ **[5]**

17 The monthly salaries, in pounds (£), of the staff at a garden centre are:

360 380 440 460 460 550 600 600 850 880 960 960

(a) Work out the mean monthly salary.

(a) £ _____ **[3]**

(b) The garden centre also employs one manager who is paid a monthly salary of £2400, and two assistant managers who are each paid a monthly salary of £1500.

Give a reason why the manager might want to include these salaries when he calculates the mean monthly salary for a pack sent out to job applicants.

_____

_____ **[1]**

18 **(a)** Gareth is making concrete for the base of a garden shed.
First he makes the dry concrete mix.
He mixes cement, sand and gravel in this ratio

cement : sand : gravel = 1 : 3 : 4

Gareth has 80 kg of cement
225 kg of sand
310 kg of gravel

What is the maximum weight of the dry concrete mix that Gareth can make?

(a) _____ kg **[4]**

(b) Gareth's concrete mix has a volume of 0.32 m^3.
The base of his shed is a rectangle 1.6 m by 1.5 m.

Work out the depth of the concrete in the base.

(b) _____ m **[2]**

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