Candidate Name	Centre Number					Candidate Number				
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GCSE MATHEMATICS

COMPONENT 1

Non-Calculator Mathematics

Foundation Tier

SPECIMEN PAPER

2 hours 15 minutes

ADDITIONAL MATERIALS
The use of a calculator is not permitted in this examination.
A ruler, protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES
Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided in this booklet.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the need for good English and orderly, clear presentation in your answers.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.	**3**	
3.	**4**	
4.	**4**	
5.	**2**	
6.	**11**	
7.	**3**	
8.	**5**	
9.	**4**	
10.	**2**	
11.	**5**	
12.	**3**	
13.	**2**	
14.	**5**	
15.	**6**	
16.	**4**	
17.	**4**	
18.	**3**	
19.	**3**	
20.	**5**	
21.	**4**	
22.	**3**	
23.	**5**	
24.	**6**	
25.	**4**	
26.	**4**	
27.	**5**	
28.	**2**	
29.	**5**	
TOTAL	**120**	

Formula list

Area and volume formulae

Where r is the radius of the sphere or cone, l is the slant height of a cone and h is the perpendicular height of a cone:

$$\text{Curved surface area of a cone} = \pi rl$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

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

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

Kinematics formulae

Where a is constant acceleration, u is initial velocity, v is final velocity, s is displacement from the position when $t = 0$ and t is time taken:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

1. From the numbers

27 13 9 10 48 8

write down

a multiple of 5, ... [1]

a prime number, ... [1]

the value of 3^3, ... [1]

$\sqrt{64}$. ..... [1]

2. *(a)* Write the number 7 500 000 in words. [1]

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(b) What is the value of the 9 in the number 239 815. [1]

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(c) Using all the digits **6 7 3 8** write down the smallest odd number. [1]

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3. Some people took part in a book quiz.
The number of points that each person scored in the quiz is shown below.

16	27	18	26	28	10	22	29
25	13	28	23	19	26	14	25
26	15	17	27	11	27	16	21
11	24	29	18	24	12	28	17

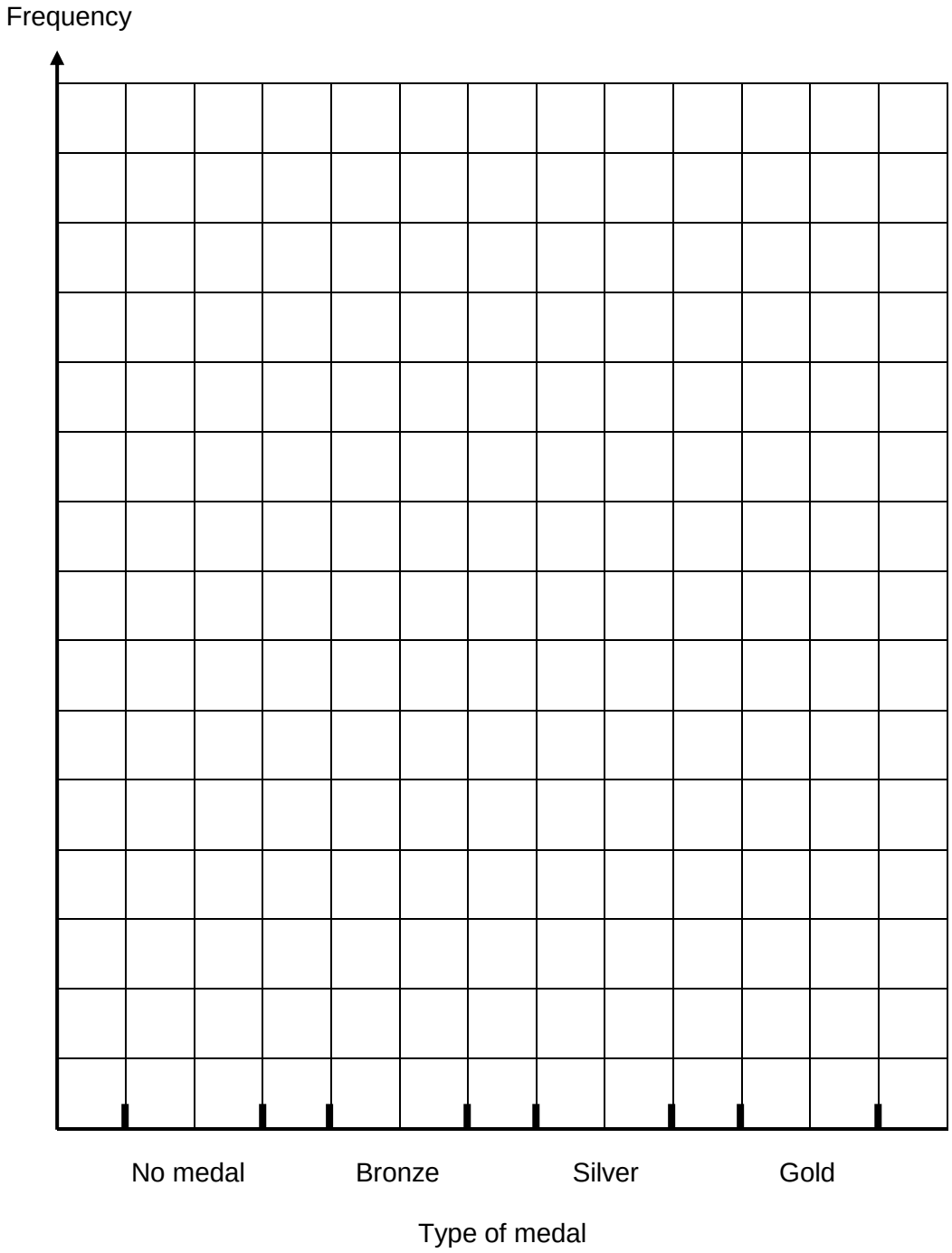
(a) A table is drawn to summarise these results and to show the number of medals that were awarded at the end of the competition.

Complete the table below.

You must make sure that all the intervals in the Points column are of equal width. [2]

Points	Number of competitors	Type of medal
10 to 14	6	No medal
15 to 19		Bronze
..... to		Silver
..... to 29		Gold

(b) Using the squared paper below, draw a suitable bar chart that shows how the medals were shared. [2]



4. *(a)* Write 2187 correct to the nearest 10. [1]

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(b) Write 54 478 correct to the nearest 1000. [1]

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(c) **Estimate** the answer to $51 \times 3{\cdot}9$. [2]

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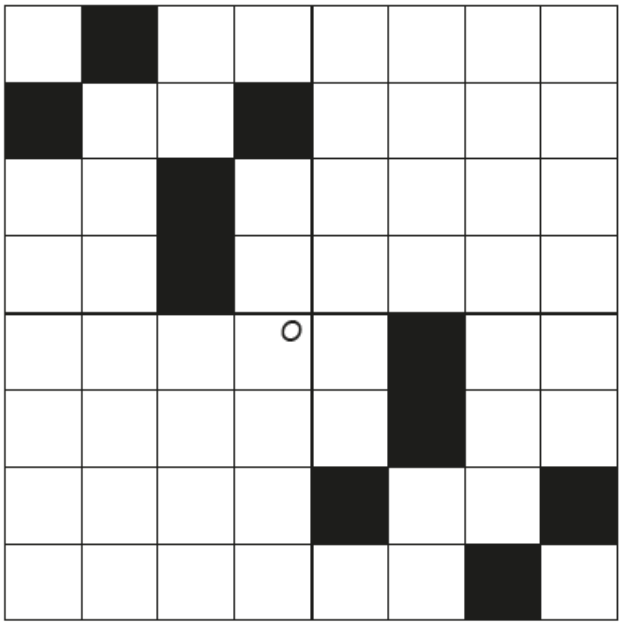
5. Draw patterns like the given ones in each of the other 2 sections, so that the completed pattern has rotational symmetry of order 4 about *O*. [2]



6. The table shows the number of cars that used a town's car park during a period of one week.

Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun	**TOTAL**
Number of cars	104	43	112	163	116	182	80	**800**

(a) How many cars used this car park during the weekend (Saturday and Sunday)? [1]

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(b) One of the days between Monday and Friday is the town's market day. On another day, between Monday and Friday, the shops are only open in the morning.

Using the information given in the table, which days do you think they are? [2]

Market day	Morning opening only

(c) The car park has space for 170 cars. Explain how it was possible for 182 cars to have used the car park on Saturday. [1]

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The charge for using this car park is displayed on the notice shown below.

CAR PARK

Monday to Friday: £2 per day
Free parking on Saturday and Sunday

(No time limit)

(d) How much money was spent on parking at this car park for the week shown in the table? [2]

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(e) The town council is considering a new system for the way it charges for parking.
The new system is

- reducing the charge to £1.50
  and
- charging this amount on all seven days of the week
  and
- allowing free parking for those who stay for less than one hour.

That week, a quarter ($\frac{1}{4}$) of the cars stayed for less than one hour.

Using this information, decide whether this new system would collect more or less money for the council.
You must show all your working. [3]

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(f) State an assumption you have made in part *(e)* and explain how your results would change if this assumption had not been made. [2]

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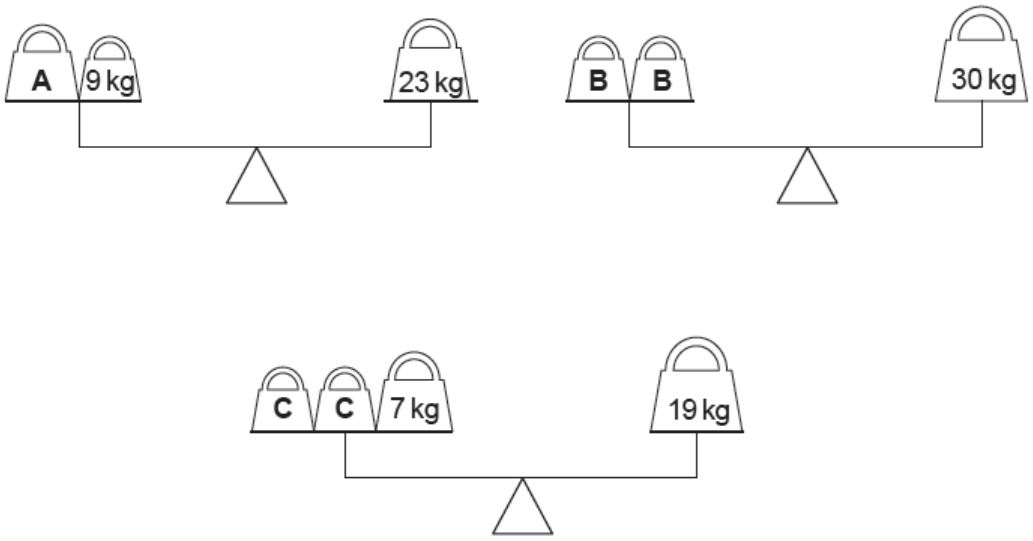
7. Each diagram represents a balance with the total weight on each side being equal. Find the values of **A**, **B** and **C**. [3]



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A = ……kg **B =** ……kg **C =** ……kg

8. Points *A* and *B* are at the end of one of the longest straight roads in the USA.

In the scale diagram below, 1 cm represents 10 km.

A ——————————————— *B*

(a) What is the actual distance between point *A* and point *B*? [3]

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(b) Would a bicycle travelling at an average speed of 40 km/h cover the distance from point *A* to point *B* in less than 2 hours?
You must explain your answer. [2]

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9. Shari was asked to buy the following items from her local shop.

Item	Price
Chicken curry	£2.97
Pizza	£3.04
Washing powder	£6.09
Butter	£1.47
Bread	89 pence

The shopkeeper tells Shari that the total cost is £102.23.

Shari does not think that this is correct.

(a) Show clearly how Shari could **approximate each of these prices** to convince the shopkeeper that **his total** is not correct. [3]

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(b) What mistake do you think the shopkeeper made? [1]

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10. A piece of wood is 32 cm long.
Alan wants to drill two holes in the wood at points *A* and *B,* where *AB* = 18 cm.
The distance *PA* and *QB* must be equal.

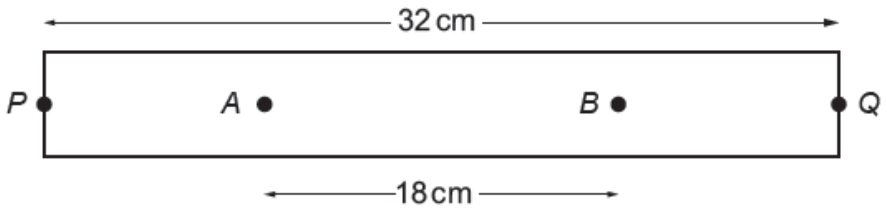

Diagram not drawn to scale

Calculate the length *PA.* [2]

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11. Simplify each of the following.

(a) $7a + 3b + 2a + 5b$ [2]

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(b) $3(y - 2)$ [1]

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(c) $3y \times 2y$ [1]

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(d) $\dfrac{y^6}{y^2}$ [1]

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12. Three identical rectangles, each measuring 7 cm by 3 cm, are placed together to make the shape shown in the diagram.

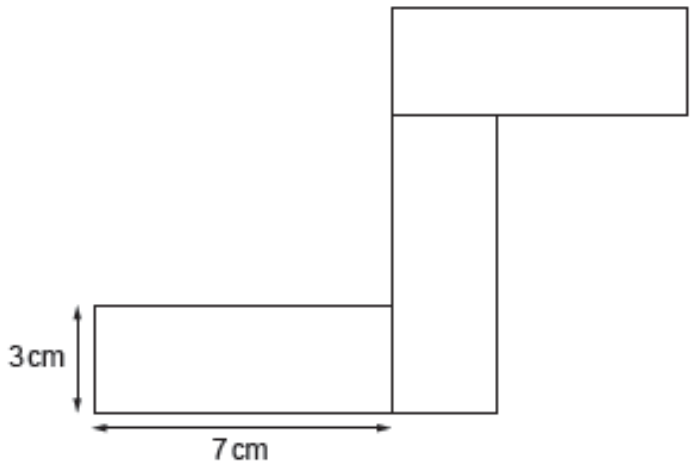

Diagram not drawn to scale

Calculate the perimeter of the shape. [3]

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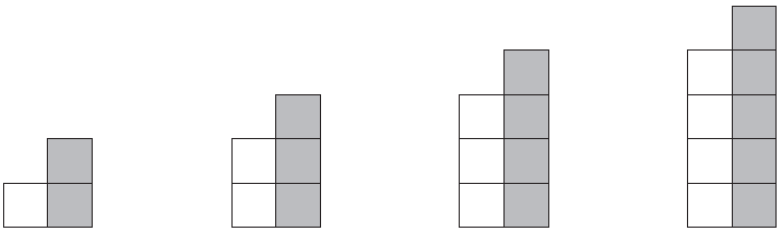
13. The following patterns have been made using shaded and unshaded squares.



Pattern 1 2 3 4

Find the **total** number of squares in pattern 60. [2]

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14. Shafira had collected £720 in a sponsored event.

She gave $\frac{1}{2}$ of the amount collected to her local youth club.

She gave 40% of the amount collected to a children's hospital.

She gave the rest of the money to a mountain rescue group.

(a) How much money did Shafira give to the mountain rescue group? [3]

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(b) What percentage of the £720 did Shafira give to the mountain rescue group? [2]

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15. Susan recorded the temperature outside her house five times on one day.
She recorded the first temperature at 7:00 a.m. and repeated the process every three hours.

The temperatures she recorded are shown in the table below.

(a) Complete the table to show the times at which she recorded the other three temperatures. [2]

Time	7:00 a.m.				7:00 p.m.
Temperature	14°C	18°C	23°C	19°C	16°C

(b) What was the range of the temperatures that Susan recorded? [1]

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(c) What was the mean of the temperatures that Susan recorded? [2]

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(d) Explain why the answers you have found may not be the correct mean and range of the temperature for the whole time between 7:00 a.m. and 7:00 p.m. [1]

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16. The diagram below shows a sign that needs to be painted.

Paint, worth a total of £60, can cover an area of $18\,m^2$.

How much would it cost to paint the sign below using this paint? [4]

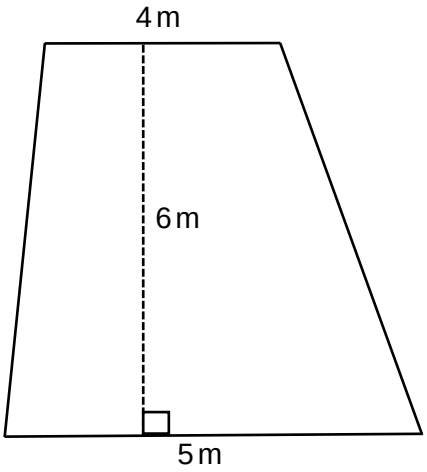

Diagram not drawn to scale

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17. In the diagram below, *ABD* is a straight line.
$A\hat{C}B = 80°$ and $C\hat{B}D = 130°$.
Show that triangle *ABC* is an isosceles triangle.
You must explain your reasoning. [4]

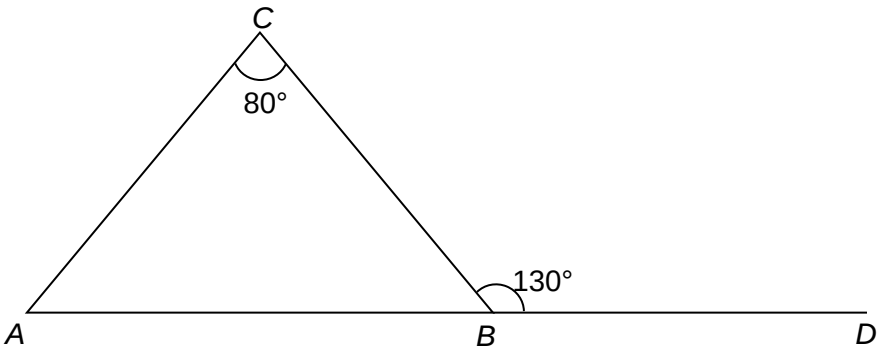

Diagram not drawn to scale

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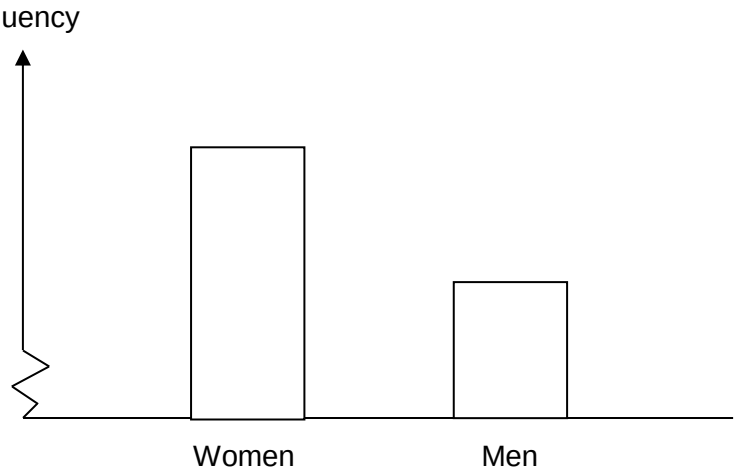
18. *(a)* Explain why the statements that accompany each of the following diagrams in a newspaper may not be true.
Your comments should be based on the diagrams and not on your personal opinion.

(i) Taken from an item about accidents in the home. [1]



'Twice as many women as men have accidents in the home.'

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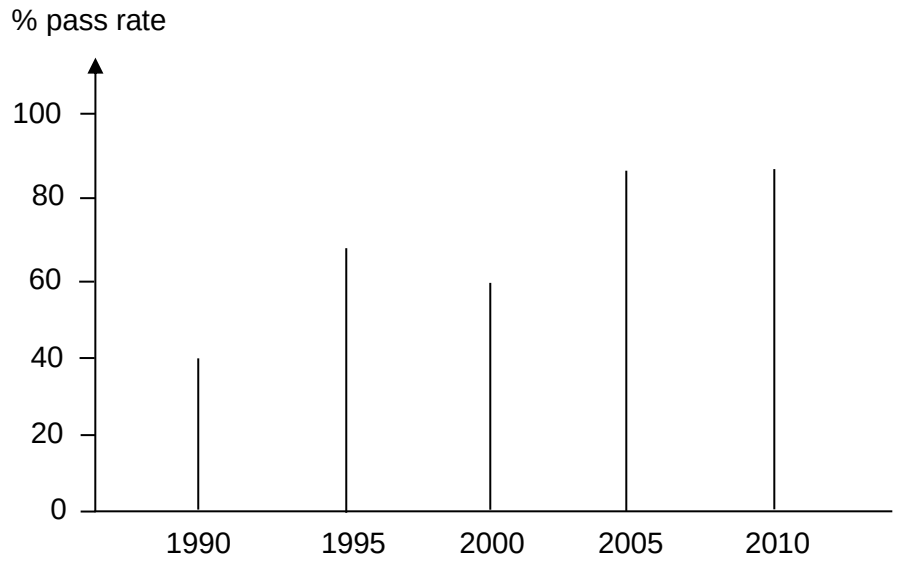
(ii) Taken from an item about a school's examination percentage pass rates. [1]



'The percentage pass rate has remained constant between 2005 and 2010'

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(b) Is the following statement true or false?
You must give a full explanation for your decision. [1]

'Every whole number that ends in a 3 is a prime number'.

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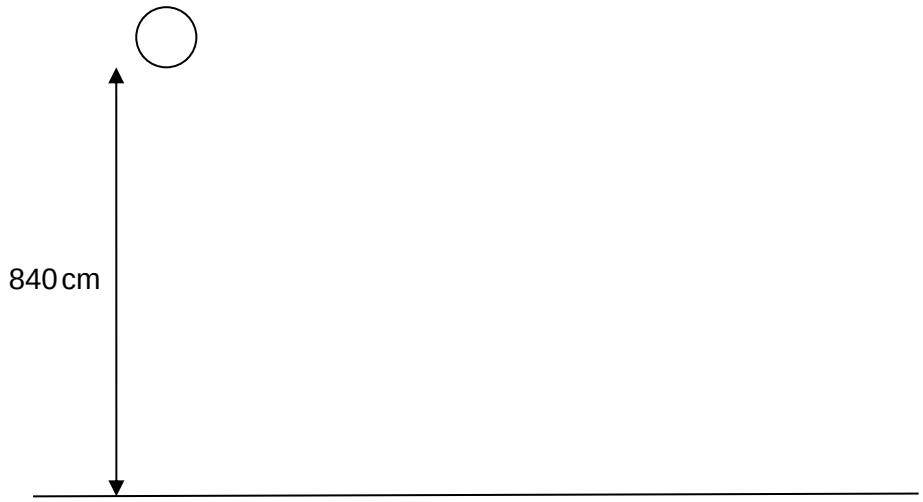
19. A ball is dropped from a height of 840 cm onto a floor.
After each bounce it rises to a height that is half of the distance it has just fallen.



After how many bounces will the ball fail to reach a height of 1 m for the first time?
You must show all your working. [3]

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20. The areas of two rectangles A and B are in the ratio 1 : 3 respectively.
Rectangle A measures 4 m by 3 m.

(a) (i) Give a possible pair of values for the length and width of rectangle B. [3]

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Length = ... Width = ...

(ii) Give a **different** possible pair of values for the length and width of rectangle B. [1]

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Length = ... Width = ...

(b) Are the two rectangles you have identified in part *(a)* **similar**?
You must give a reason for your answer. [1]

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21. Last year, there were 36 pupils in a class.
Of these pupils, 20 studied French, 9 studied German and 3 studied both French and German.

A pupil was chosen at random from the class.
Find the probability that the pupil did not study French or German. [4]

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22. Factorise the following expressions.

(a) $6x^2 + 8x$ [2]

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(b) $x^2 - 100$ [1]

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23. Amir buys 10 bags of daffodil bulbs at a total cost of £24.

A label on each bag states that it contains between 30 and 40 bulbs.

Amir states that the cost per single daffodil is 8p.

(a) Explain how Amir reached this conclusion.
You must show working to support your answer. [2]

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(b) What could have been the lowest cost per single daffodil bulb that Amir paid? [2]

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(c) Using your answers to parts *(a)* and *(b)*, write down what conclusion can be made about the cost of a single daffodil bulb. [1]

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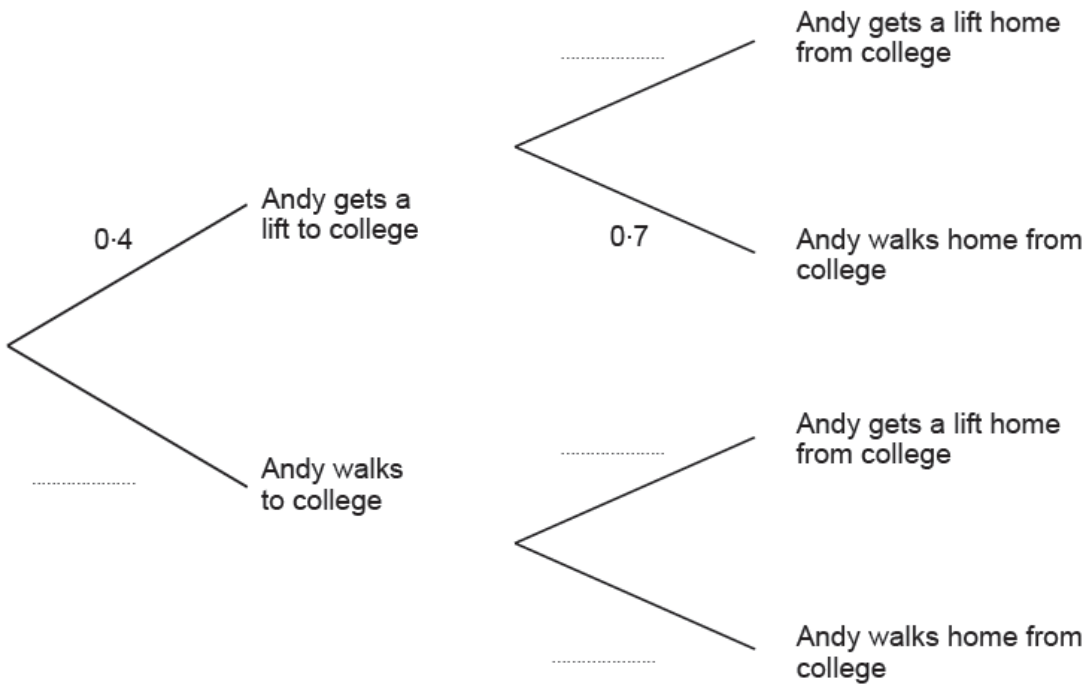
24. Andy sometimes gets a lift to and from college.
When he does not get a lift he walks.
The probability that he gets a lift to college is 0·4.
The probability that he walks home from college is 0·7.
Getting to college and getting home from college are independent events.

(a) Complete the following tree diagram. [2]



(b) Calculate the probability that Andy gets a lift to college and walks home from college [2]

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(c) Calculate the probability that Andy **does not** get a lift to or from college. [2]

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25. Cherry Blossom paint is made by mixing red and white paint in a certain ratio.
4 litres of **red** paint is used to make 9 litres of Cherry Blossom paint.
The diagram below shows the relationship between the amount of red paint and the amount of white paint needed to make Cherry Blossom paint.

Write down the correct scale on the 'Amount of red paint (litres)' axis.
You must put a value on each of the dotted lines on the axis.
You must show all your working to support your answer. [4]

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26. Alex bought 3 tins of paint and 4 brushes at a total cost of £23.
Brian bought 2 tins of paint and 3 brushes at a total cost of £16.

Using an algebraic method, calculate the price of a single tin of paint and the price of one brush.

[4]

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The price of a single tin of paint = ……

The price of one brush = ……..

27. Peter decides to cover the floor of a room with a striped carpet.
A shop sells this striped carpet from a roll that is 3 m wide at a price of £25 per metre length.

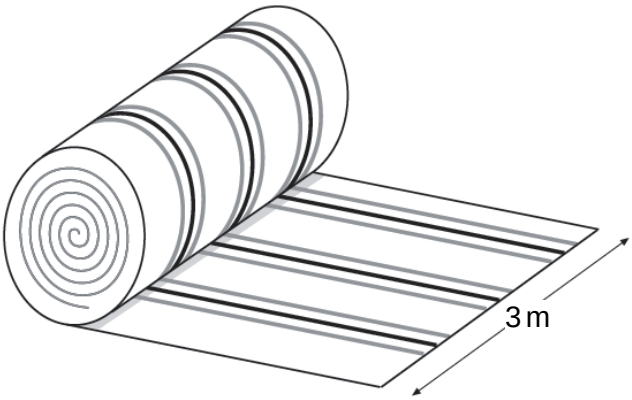

Diagram not drawn to scale

His floor is rectangular in shape with length 13 m and width 8 m.

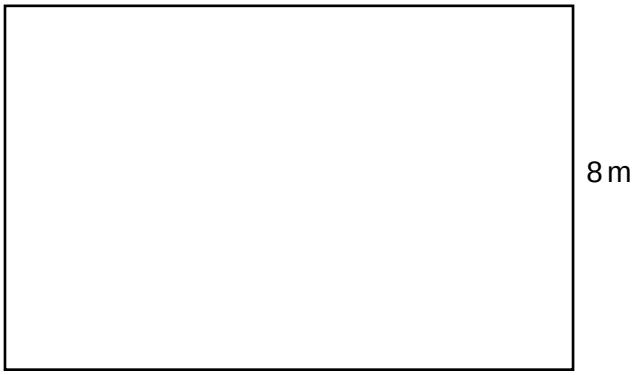

Diagram not drawn to scale

The carpet is laid to ensure that the stripes on the carpet are parallel to two of the sides of the room and lie in one direction only.

Find the cost of the cheapest way of covering the floor, and state by how much it is cheaper.
Show all your working. [5]

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28. Find, in standard form, the value of $(3 \times 10^2) \times (5 \times 10^6)$. [2]

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29. A building company used 24 workers to prepare a building site.
The site measured 30 acres and the work was completed in 10 days.

(a) The company is asked to prepare another site measuring 45 acres.
This work has to be completed in 15 days.
Calculate the least number of workers the company should employ for this work. [3]

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(b) State one assumption you have made in your answer to part *(a)*.
How would your answer to part *(a)* change if you did not make this assumption? [2]

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