Candidate Name	Centre Number					Candidate Number				
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GCSE MATHEMATICS

COMPONENT 2

Calculator-Allowed Mathematics

Foundation Tier

SPECIMEN PAPER

2 hours 15 minutes

ADDITIONAL MATERIALS
A calculator will be required for 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 or use the π button on your calculator.

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.	**6**	
2.	**2**	
3.	**2**	
4.	**3**	
5.	**2**	
6.	**4**	
7.	**2**	
8.	**6**	
9.	**4**	
10.	**3**	
11.	**3**	
12.	**2**	
13.	**5**	
14.	**5**	
15.	**5**	
16.	**5**	
17.	**4**	
18.	**5**	
19.	**4**	
20.	**6**	
21.	**3**	
22.	**4**	
23.	**7**	
24.	**3**	
25.	**5**	
26.	**2**	
27.	**6**	
28.	**4**	
29.	**4**	
30.	**4**	
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. (*a*) Lisa buys the following items from an online music store.

Complete her bill. [3]

Item	Cost
10 badges at 85p each	£
3 T-shirts at £7.95 each	£
20 blank CDs at £2.49 per pack of 5	£
Total	£

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(*b*) The online store gives free delivery when the total cost is £50 or over.
How much more does Lisa need to spend to get free delivery? [1]

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(*c*) The music store also has a special offer on music-video downloads.

Download one music-video for £1.99

SPECIAL OFFER TODAY

3 for the price of 2

What is the cost of 9 music-video downloads with this special offer? [2]

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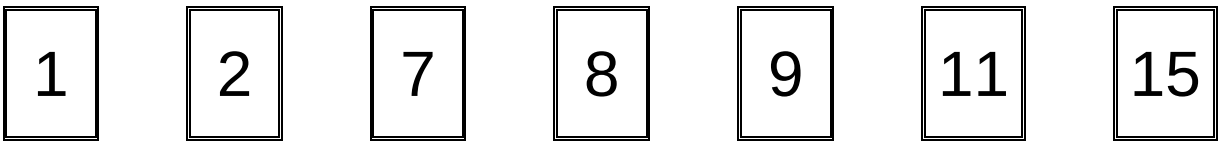
2. Circle the numbers that are multiples of **both** 3 **and** 4. [2]

10 **11** **12** **13** **14** **15**

16 **17** **18** **19** **20**

21 **22** **23** **24**

3. Seven numbered cards are placed face down.



One card is chosen at random.
What is the probability that the card chosen will have:

(a) an odd number? [1]

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(b) a number greater than 8? [1]

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4. In a school, $\frac{3}{5}$ of the pupils are girls.
There are 390 girls in the school.

Calculate the total number of pupils in the school. [3]

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5. A square *ABCD* has sides of length 5 units.
Find the coordinates of point *C*.

[2]

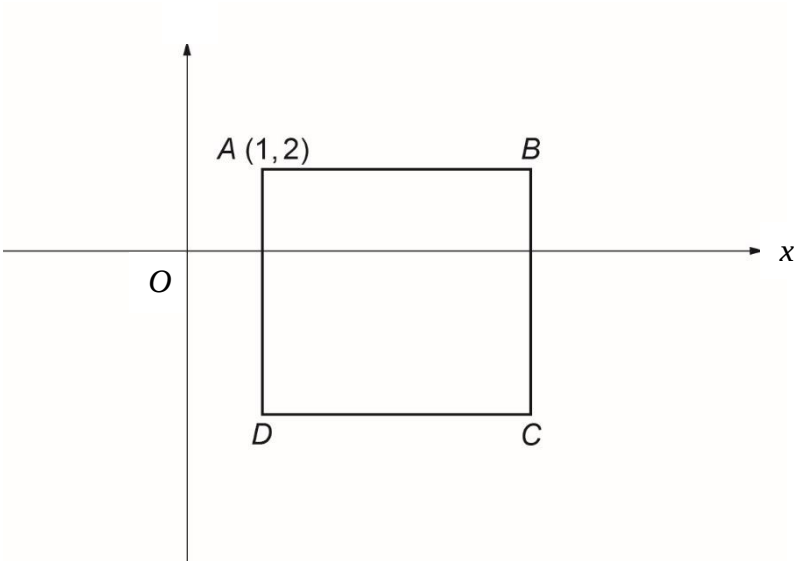

Diagram not drawn to scale

Coordinates of *C* = (…….. , ……)

6. Charlie has x pens.
Lisa has 3 more pens than Charlie.
Julian has twice as many pens as Lisa.
How many pens do Charlie, Lisa and Julian have altogether?
Simplify your answer as far as possible. [4]

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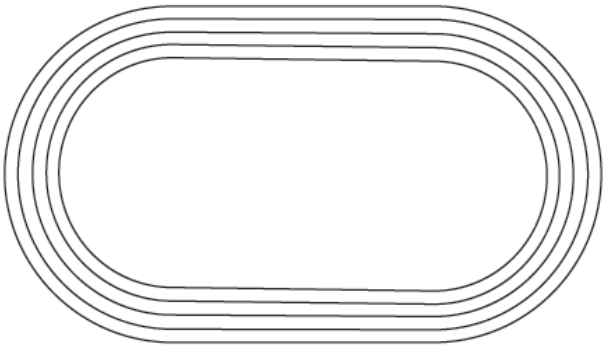

A single lap of an athletics track is 400 metres.
How many laps will a person run in a two kilometre race? [2]

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8.

A fashion store buys 200 bracelets for £6.30 each.
The store sells 60% of the bracelets for £10 each.
The remaining bracelets are later sold at a reduced price of £4 each.
How much profit or loss did the fashion store make?
You must show all your working. [6]

9. *(a)* Solve $4x = 16$. [1]

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(b) Solve $\frac{y}{5} = 4$. [1]

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(c) Solve $5a - 8 = 17$. [2]

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10. Angela plays netball for her local team.
The number of goals she has scored in her first seven games is 3, 4, 5, 5, 6, 8 and 9.

(a) Explain why the mode is 5. [1]

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(b) Angela's coach thinks that it is possible for Angela to achieve a median of 6 and a range of 7 after two more games are completed.
Give a possible number of goals scored in each of the next two games that would allow Angela to achieve this.
[2]

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11. Using the formula below, find the value of k when $p = 50$ and $q = 10$.
You must show all your working. [3]

$$2q = p - 10k$$

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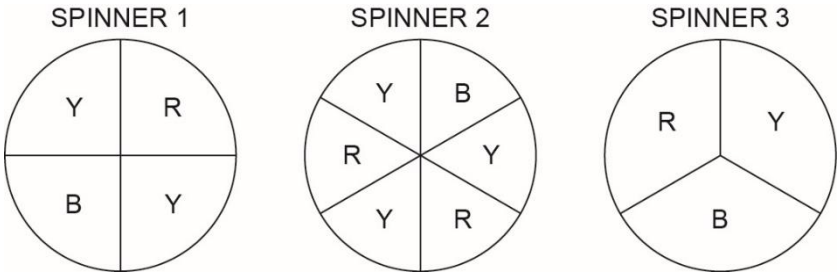
12. Kyle and Ethan play a game using a spinner.
A player wins when the spinner stops on their chosen colour.
A player can choose from the colours Yellow (Y), Black (B) or Red (R).
Kyle always chooses Red.
Ethan always chooses Yellow.

Which of the following spinners should Ethan choose so that he has the greatest chance of beating Kyle?
Give a reason for your answer.

[2]



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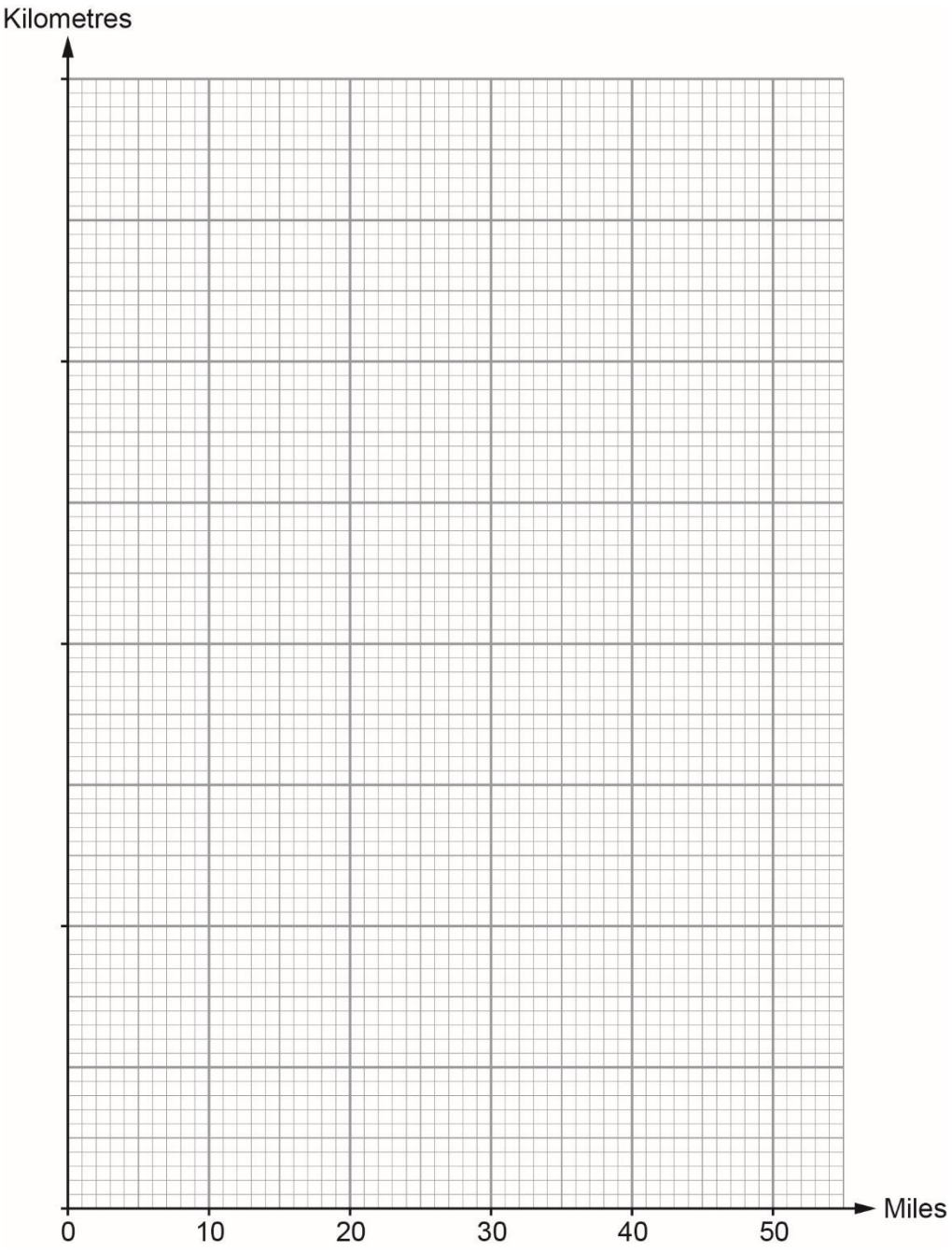
13. Martin prefers to measure distances in kilometres rather than miles.
The following table shows the number of miles and the number of kilometres for each of three distances.

Miles	5	30	42·5
Kilometres	8	48	68

(a) Use the data in the table to draw a conversion graph. [3]



(b) The distance between Martin's house and his favourite bicycle shop is 70 miles.

Explain how he can use the graph to find this distance in kilometres.

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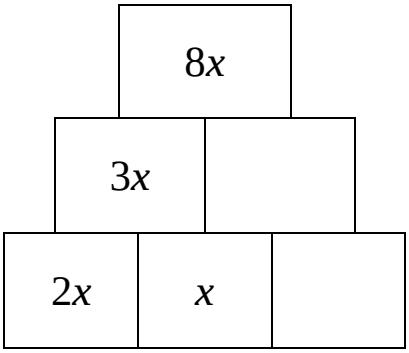
Complete the following sentence:

70 miles is approximately **.....** km.

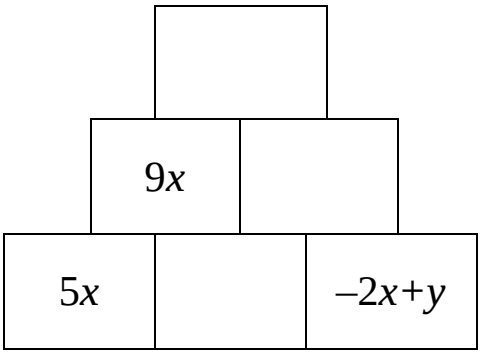
[2]

14. To fill in a block, you must add the values on the two blocks directly below it.
Some values are already displayed.
Fill in the empty blocks.
You must simplify your answer.

(a) [2]



(b) [3]



15. On 1 January 2014, Jasmine weighed 84 kg and was overweight for her height.
By eating healthy food and exercising she lost 6% of her body weight during the first three months of 2014.
Her weight then remained the same for the next two months.
During June, Jasmine cycled every day and, by doing so, she lost 2·8% of her April body weight.

(a) Calculate Jasmine's body weight at the end of June. [3]

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(b) What percentage of her original body weight did Jasmine lose in these six months?

[2]

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16. On an island there are two companies that hire out fishing boats to visitors.

Fishing Boats R Us	Ocean Blue Boats
Hire charges	Hire charges
£45 for first hour then £30 per hour (or part of an hour)	£32 per hour (or part of an hour)

Robert wants to hire a boat to go fishing with his friends.
He needs the boat from 9:15 a.m. to 5:30 p.m.
Which company would you advise Robert to use?
Show all your working and a give a reason for your answer.

[5]

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17. Faizal has £400.

He spends $\frac{1}{4}$ of it on rent and $\frac{2}{5}$ of it on food.

What fraction does he have left?

Write your answer in its simplest terms.

[4]

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18. *(a)* What percentage is £95 of £250? [2]

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(b) The total cost of 6 copies of a magazine and 4 copies of a newspaper is £29.04.
The magazines cost £4.12 each.
Find the cost of one newspaper. [3]

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19. A cuboid with length 45 cm, width 20 cm and height 35 cm is completely filled with water.
The water is then poured into a larger cuboid with length 100 cm and width 15 cm.
Calculate the height of the water in the larger cuboid.
Show all your working.

[4]

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20. A team of examiners has 48 000 examination papers to mark.
It takes each examiner 1 hour to mark approximately 16 papers.

(a) The chief examiner says that a team of 25 examiners could mark all 48 000 papers in 8 days.
What assumption has the chief examiner made?
You must show all your calculations to support your answer. [4]

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(b) Why is the chief examiner's assumption unrealistic?
What effect will this have on the number of days the marking will take?
[2]

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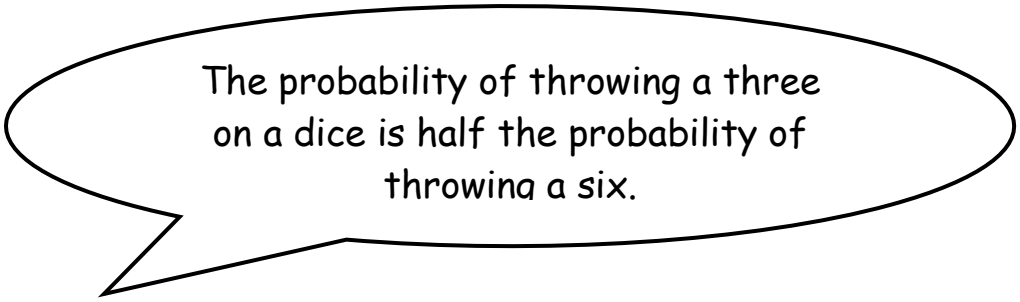
21. Nancy makes two statements about the probability of events based on throwing fair dice.

For each of her statements below, decide whether or not Nancy is correct.
You must explain your decisions **using probabilities**.



Is Nancy correct? .....

Explanation:

[1]

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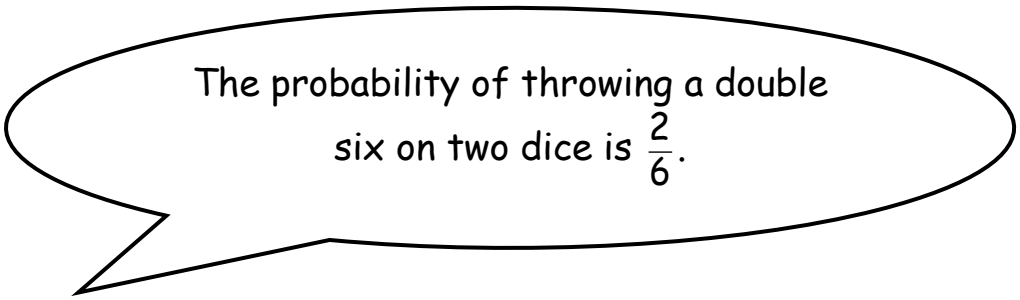

Is Nancy correct? .....

Explanation:

[2]

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22. Complete the table below.

Original amount	After a decrease of	
	40%	2%
£ ……..….	£492	£ ……..….

[4]

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23. Eliza makes this **sketch** of a pond.

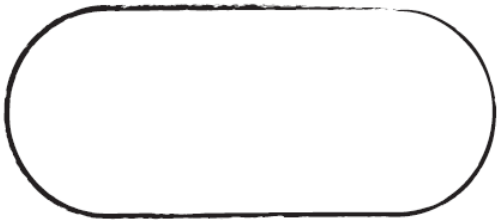

Diagram not drawn to scale

The shortest distance across the pond is 6 m.
The longest distance across the pond is 20 m.

Eliza estimates that the surface area of the pond is 120 m^2.

(a) Explain how Eliza arrived at her estimate. [2]

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(b) **Calculate** an estimate for the surface area of the pond that would be more accurate than Eliza's estimate.
Explain how you have decided to calculate your estimate.
You must justify your decision.
Show all of your working.

[5]

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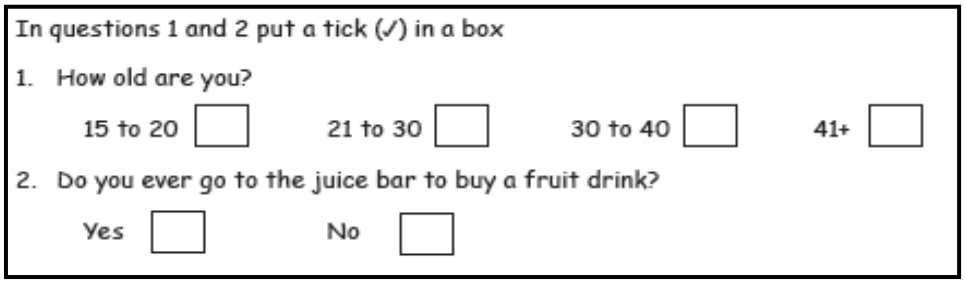
24 A survey is carried out by asking people questions as they come out of a juice bar.

A section of the questionnaire is shown below.



(a) Explain why this is a biased survey. [1]

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(b) State two criticisms of the design of question 1. [2]

First criticism of question 1:

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Second criticism of question 1:

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25. The diagram shows a square.
All the lengths are measured in centimetres.

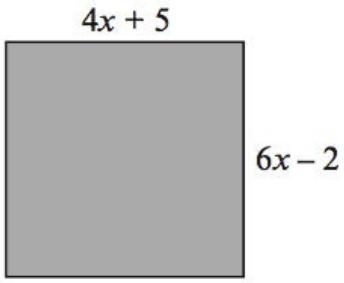

Diagram not drawn to scale

Use an algebraic method to find the length of one side of the square. [5]

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26. Find the nth term of the sequence 6, 13, 20, 27, … [2]

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27. *(a)* When visiting a hat shop, each customer had the circumference of their head measured.

The table shows the results for the customers who bought a hat during December.

Head circumference, c (cm)	Number of customers
$50 \leq c < 54$	12
$54 \leq c < 58$	32
$58 \leq c < 62$	14
$62 \leq c < 66$	2

Calculate an estimate for the mean head circumference.

[4]

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(b) The hat shop sells 4 different sizes of hats.

The conversion table from head circumference to hat size is shown below

Head circumference, c (cm)	Hat size
$50 \leq c < 54$	1
$54 \leq c < 58$	2
$58 \leq c < 62$	3
$62 \leq c < 66$	4

A salesman places an order for new stock for the hat shop.
The salesman's order form shows that about half of the hats ordered are size 2.
The owner of the shop says the order should show that about a quarter of the hats ordered are size 2.
Who is more likely to be correct, the salesman or the owner of the shop?
You must give a reason for your answer.

[2]

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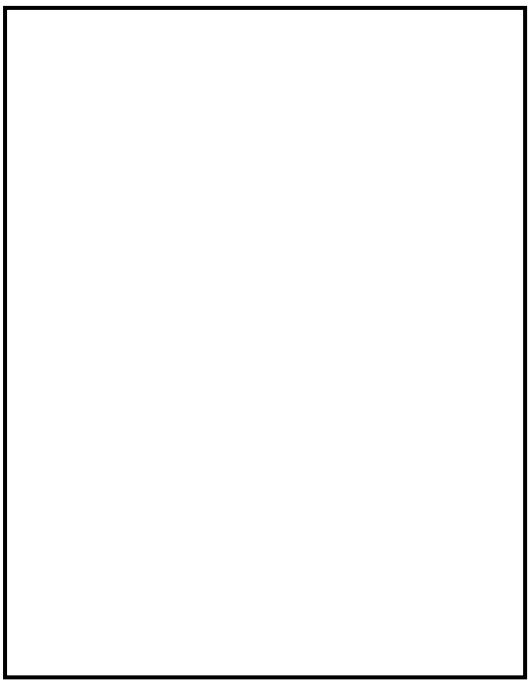
28. A statue is on display inside a glass cuboid.
A scale drawing of the plan view (bird's eye or aerial view) of the cuboid is shown below.

Scale 1 cm : 20 cm

A barrier is built around the cuboid so that no one can stand within 60 cm of the cuboid.
Using the given scale, draw accurately the barrier on the scale drawing shown below.
[4]



29. A man is working out the height of a vertical tree.
The man is able to measure the angle of elevation of the top of the tree from his measuring instrument.
The measuring instrument is 1·8 m above ground level.
When the man is standing 19 m from the base of the tree, the angle he measures is 56°.

A sketch of this situation is shown below.

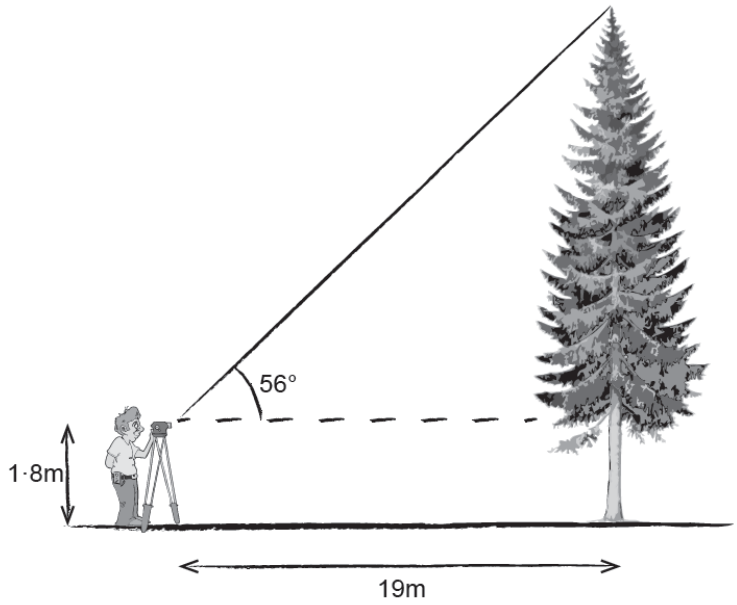


Diagram not drawn to scale

Calculate the full height of the tree. [4]

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30. *(a)* A cube of weight 10 N rests on horizontal ground.
The area of each face of the cube is $0{\cdot}2\,m^2$.
Calculate the pressure exerted by the cube on the ground.
State the units of your answer.

[3]

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(b) A different cube also has a weight of 10 N.
The area of each face of this cube is $x\,m^2$.
Find an expression for the pressure exerted by this cube on the ground.
Give your answer in terms of x.

[1]

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