



General Certificate of Secondary Education

Centre Number

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Candidate Number

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Mathematics

Unit M3
(With calculator)
Higher Tier



[GMC31]
Assessment

GMC31

TIME

2 hours.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
 Complete in black ink only. **Do not write with a gel pen.**
 Answer **all twenty-eight** questions.
 All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
 You **may** use a calculator for this paper.

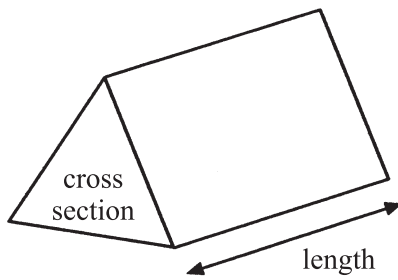
INFORMATION FOR CANDIDATES

The total mark for this paper is 100.
 Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
 You should have a calculator, ruler, compasses and a protractor.
 The Formula Sheet is on page 2.

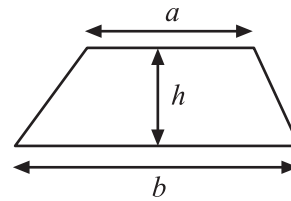


Formula Sheet

Volume of prism = area of cross section \times length

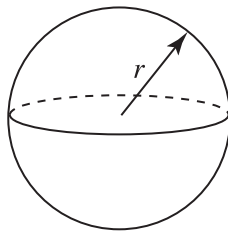


Area of trapezium = $\frac{1}{2}(a+b)h$



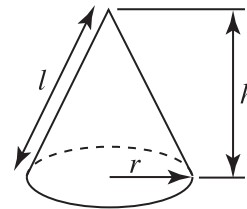
Volume of sphere = $\frac{4}{3}\pi r^3$

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

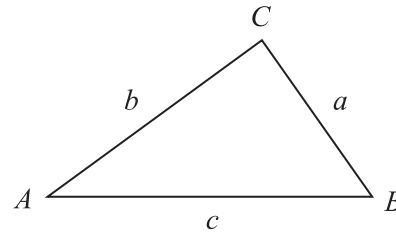


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



In any triangle ABC



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 = $\frac{1}{2} ab \sin C$



1 Solve the equations:

(a) $\frac{t}{8} = 4$

Answer $t =$ _____ [1]

(b) $9n - 2 = 52$

Answer $n =$ _____ [2]



- 2 A sports team recorded information about whether players were able to play on Saturday only, Sunday only, or both.

(a) Complete the two-way table below.

	Saturday only	Sunday only	Both Saturday and Sunday	
Defenders	5	2		7
Midfielders	4		3	8
Attackers		3	1	
		6	4	21

[2]

(b) The team decides to play on Saturday.

How many midfielders are able to play?

Answer _____ [1]

- 3 Simplify the expression

$$6e - 5w + 2e - 4w$$

Answer _____ [2]



4 Jake earns £1400 each month.

Every month he pays 4% of his earnings into a savings scheme.

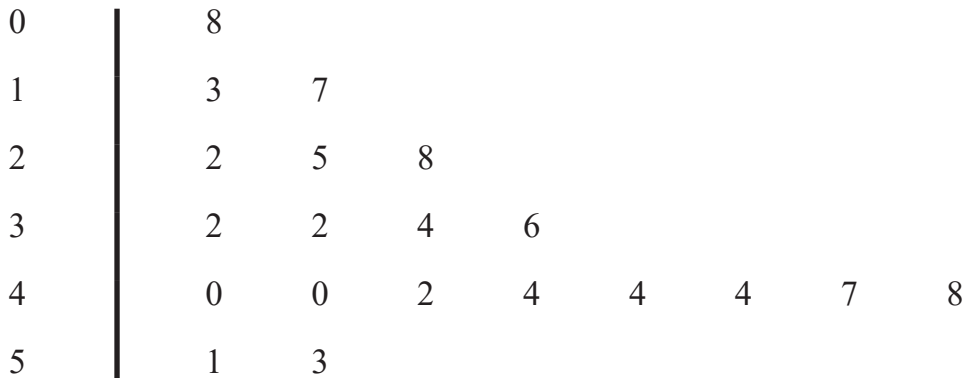
How much money will he have paid into this scheme after three months?

Answer £ _____ [3]



5 Martin asks 20 workers how many hours they normally work in a week.

The results are shown in the stem and leaf diagram below.



Key 4 | 2 means 42 hours

(a) For the data above, work out

(i) the range,

Answer _____ hours [1]

(ii) the median.

Answer _____ hours [1]

(b) Another worker normally works 39 hours in a week.

This value is added to the stem and leaf diagram.

Circle the correct word or words to make each of the following statements correct.

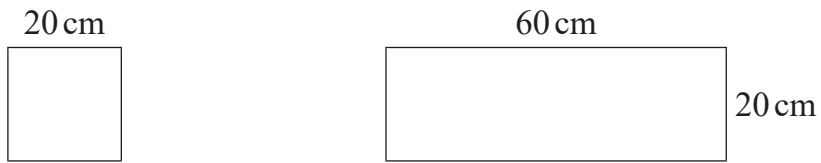
(i) The mode will increase / decrease / stay the same [1]

(ii) The range will increase / decrease / stay the same [1]

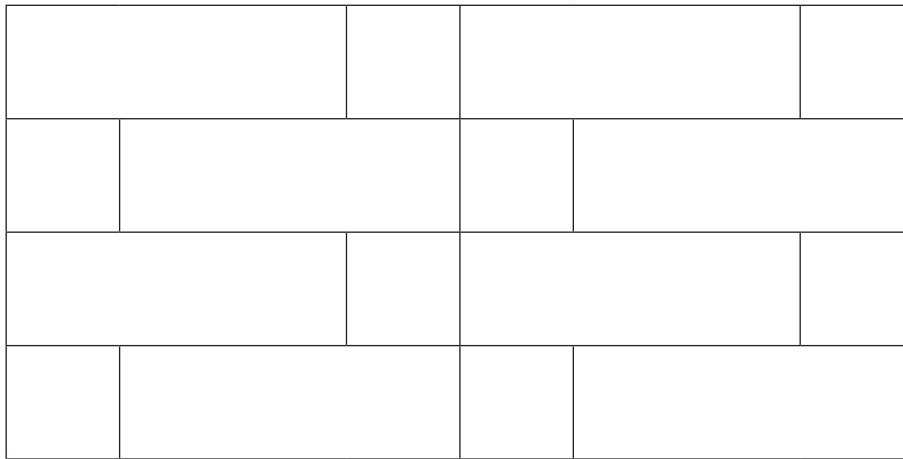
(iii) The median will increase / decrease / stay the same [1]



6 A garden table is tiled using square tiles and rectangular tiles, as shown below.



The tiled table looks like this.



Work out the **perimeter** of the table.

Give your answer in **metres**.

Answer _____ m [3]

[Turn over



7 Louise normally works 38 hours per week and is paid £9.80 per hour.

If she works any extra hours, she is paid at the overtime rate of £14.50 for each extra hour.

Last week her total earnings were £473.90

How many **extra** hours did she work last week?

Answer _____ [3]



8 Wayne wants to travel from Glasgow to Carlisle by train.

Glasgow	Depart	17:42
Carlisle	Arrive	20:11

How long will this journey take?

Answer _____ [3]

9 Suzie notices this sign in her local takeaway.

5% charge on card payments
for orders under £15

She orders food costing £12.80 and decides to pay by card.

How much will she have to pay in total?

Answer £ _____ [3]

[Turn over



10 A group of 10 people sat their driving theory test.

Their driving instructor recorded how many practice tests they did and their score in the real test.

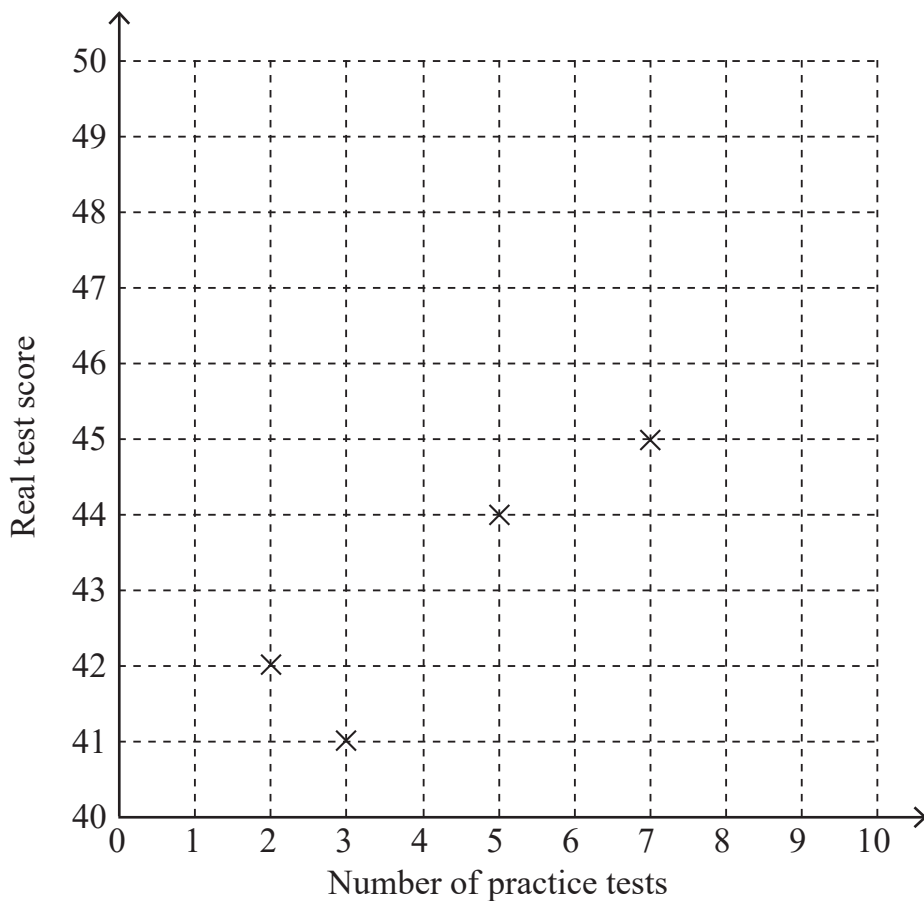
The information is recorded in the table below.

Person	A	B	C	D	E	F	G	H	I	J
Number of practice tests	2	5	3	7	4	1	9	6	5	5
Real test score	42	44	41	45	43	41	48	45	46	42

(a) Show this information on the scatter graph below.

The first four points have been plotted for you.

[2]



(b) The pass mark for the test is 44

How many of the 10 people passed the test?

Answer _____ [1]

(c) Complete the statement:

“In general, the _____ practice tests completed,

the _____ the test score.” [1]

(d) Draw the line of best fit. [1]

(e) Another person completed eight practice tests.

Use the graph to estimate their real test score.

Answer _____ [1]

[Turn over



11 A cinema ticket for an adult costs $\pounds t$

A cinema ticket for a child costs $\pounds 3$

James bought four adult tickets and seven child tickets.

The total cost was $\pounds 49$

(a) Form an equation that can be solved to find the cost of an adult ticket.

Answer _____ [1]

(b) Solve your equation to find the cost of an adult ticket.

Answer $t =$ _____ [2]



12 Bob is going to pave a patio. He needs 480 paving slabs.

He looks in three different stores.

Garden Store
32 slabs in a box
Box price = £27

Perfect Patio Store
80 slabs in a box
Box price = £70

10% discount on
5 or more boxes

Quinn's Paving Store
16 slabs in a box
Box price = £17

Buy 5 boxes,
get one extra box free

Which store will be the cheapest for him to buy the slabs in?

Show all your working.

Answer _____ [6]

[Turn over



13 Factorise $3x + 6$

Answer _____ [1]

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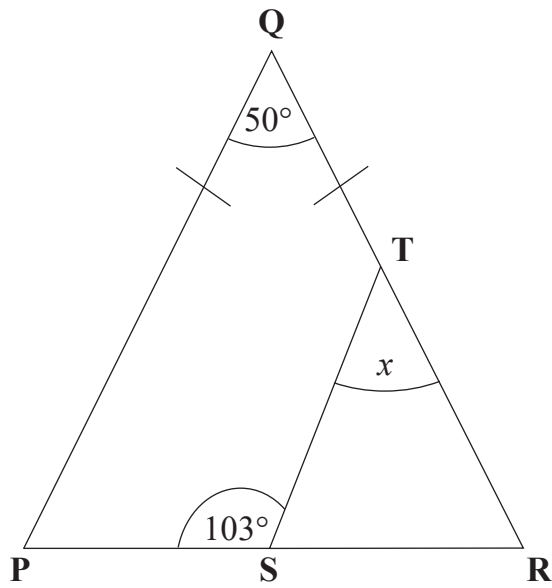


diagram
not drawn
accurately

Triangle PQR is isosceles with $PQ = QR$.

(a) Calculate the size of angle x

Answer _____° [3]

(b) Hence decide if the lines PQ and ST are parallel.

_____ because _____

_____ [2]

[Turn over



15 Solve $2(3x - 1) + 5 = 4(x + 2)$

Answer $x =$ _____ [3]



16 Data on the weights of 16 players on a sports team is recorded in the grouped frequency table.

Weight (W kg)	Frequency		
$60 < W \leq 70$	1		
$70 < W \leq 80$	5		
$80 < W \leq 90$	4		
$90 < W \leq 100$	6		

The manager states that “the estimated mean weight of the team lies within the median class”.

Is his statement correct? **You must justify your answer fully.**

[4]

[Turn over



17 Which of these numbers is prime?

Explain your reasoning clearly for each number below.

Number	11	111	1111
Yes/No			
Reason			

[2]



18 A caravan depreciates in value by 15% each year.

Two years ago Malcolm bought a new caravan costing £24 000

(a) What is its value now?

Answer £ _____ [2]

(b) Malcolm states his caravan has depreciated by 30% over the two years.

Is he correct?

Explain your answer clearly.

[3]

[Turn over

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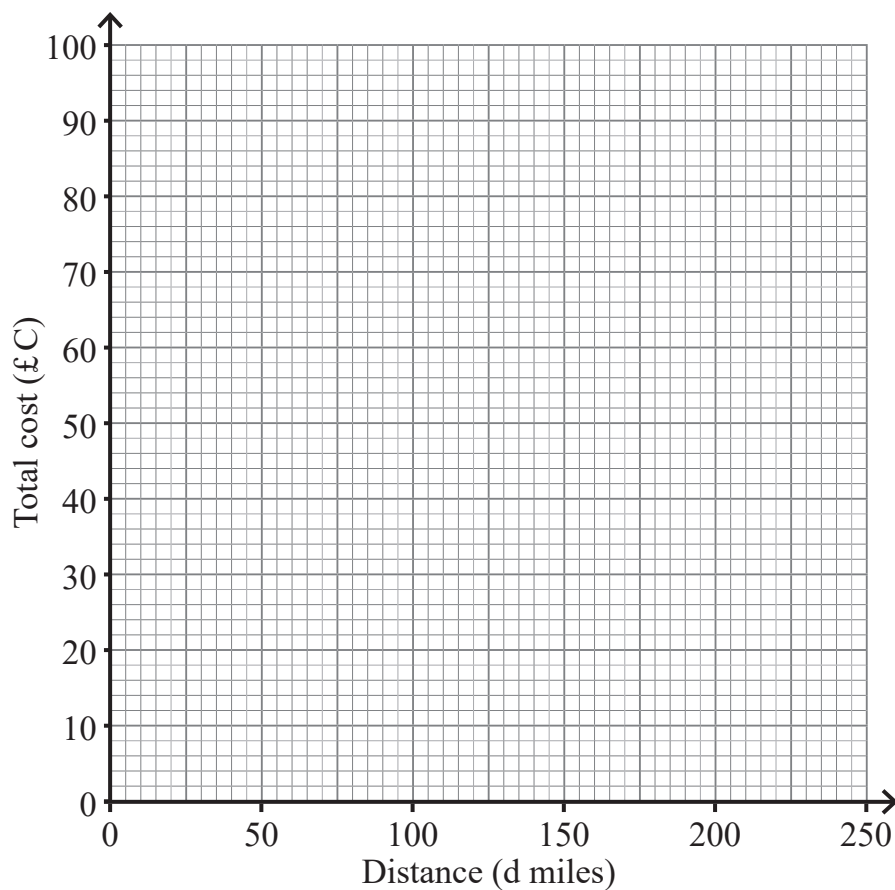
32GMC3119

19 Martine wants to hire a van.

The table shows the costs for hiring the van.

Distance (d miles)	50	100	150	200	250
Total cost (£ C)	50	60	70	80	90

(a) Draw a straight line graph to illustrate this information.



[2]



(b) Use the graph to find

(i) the initial fixed charge for hiring the van,

Answer £ _____ [1]

(ii) the cost per mile, in pence, for using the van.

Answer _____ p [1]

(c) Work out the total cost if the van travels 450 miles.

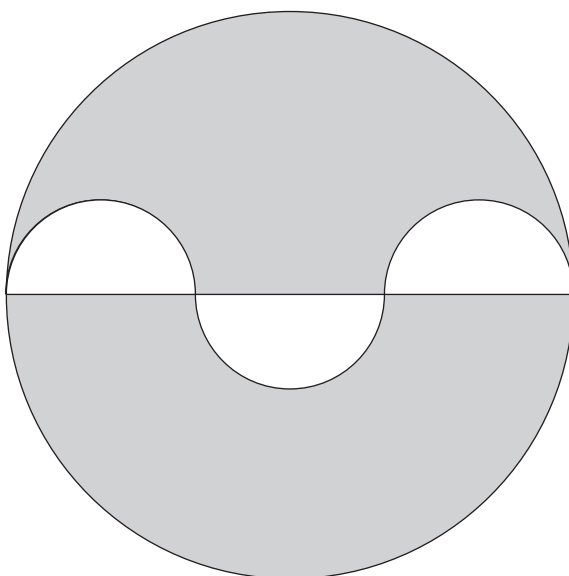
Answer £ _____ [2]

[Turn over

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32GMC3121



A large circle has three semicircles of equal diameters placed across its diameter as shown.

The radius of each of the small semicircles is 2 cm.

Work out the area shaded.

Answer _____ cm² [5]



21 Coffee is sold in 250 gram packets and costs £4.20 a packet.

Tea is sold in 450 gram packets and costs £3.60 a packet.

Helen runs a café and buys the same number of grams of coffee and tea.

What is the least amount of money she could have spent?

Answer £ _____ [5]

[Turn over

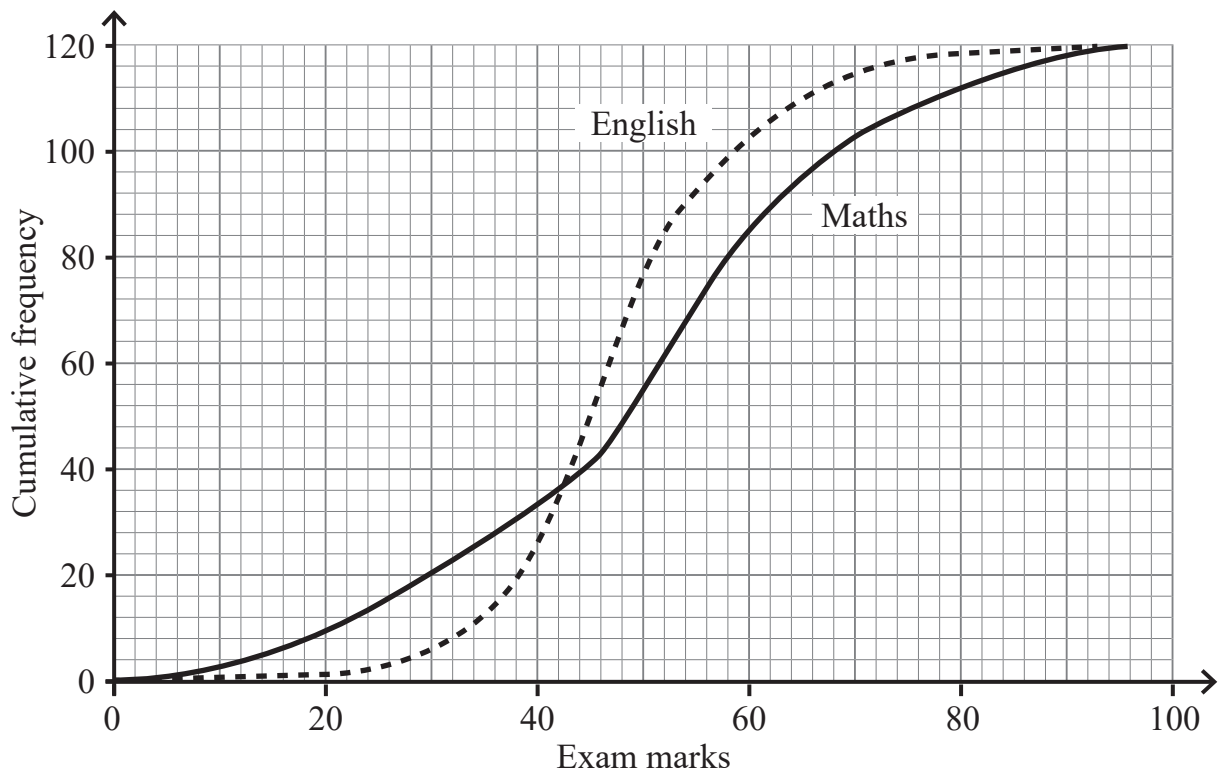
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32GMC3123

22 120 students sat a Maths exam and an English exam.

The cumulative frequency curves show the distribution of results.



With reference to three different statistical measures compare the two sets of results.

- _____ [1]
- _____ [1]
- _____ [1]



23 Factorise

(a) $p^2 - 3p$

Answer _____ [1]

(b) $100 - t^2$

Answer _____ [1]

(c) $x^2 + 2x - 15$

Answer _____ [2]



24 Calculate the perimeter of the isosceles triangle.

You must show all your working.

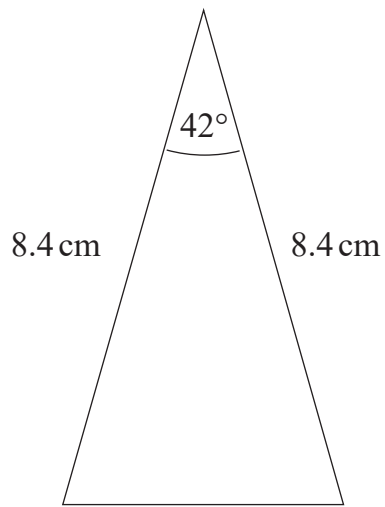


diagram
not drawn
accurately

Answer _____ cm [4]



25 A guitar is on sale in a shop.

The sale price is £120.96 after a 28% reduction.

What was the price of the guitar before the sale?

Answer £ _____ [2]

26 An elephant puts a total force of 33 000 N on its four feet.

Each foot has an area of 1500 cm²

What is the pressure the elephant exerts on the ground?

Answer _____ N/cm² [2]

[Turn over

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32GMC3127

27 Find the area of the shaded sector of this circle, centre O and radius 3 cm.

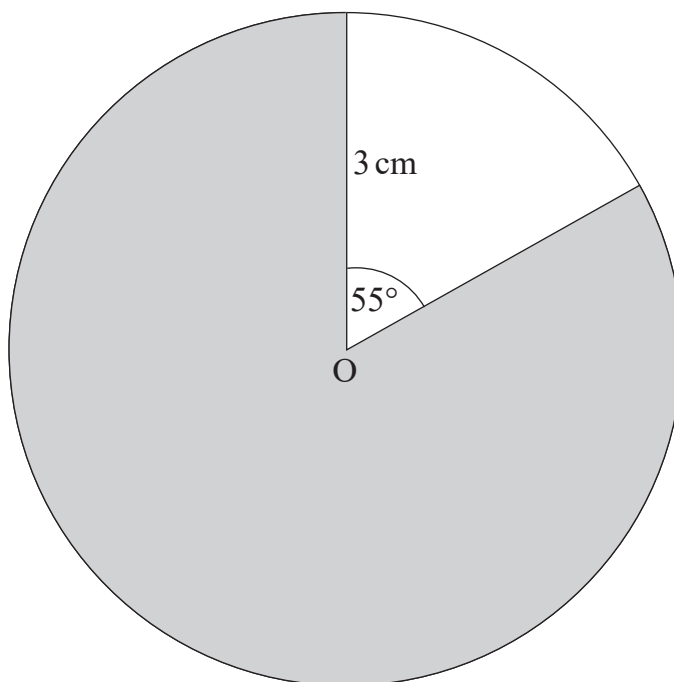


diagram
not drawn
accurately

Answer _____ cm² [2]



28 Solve the equation $\frac{2(3x + 2)}{5} - \frac{(3x - 4)}{3} = \frac{2}{15}$

Show all your working out clearly.

A solution by trial and improvement will not be accepted.

Answer $x =$ _____ [4]

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Examiner Number

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