AQA

NEW PRACTICE PAPER SET 4

Please write clearly, in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

H

Higher Tier Paper 3 Calculator

Exam Date Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
2 - 3	
4 - 5	
6 - 7	
8 - 9	
10 - 11	
12 - 13	
14 - 15	
16 - 17	
18 - 19	
20 - 21	
22 - 23	
24 - 25	
26	
TOTAL	

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

1 Circle the multiplier that reduces a quantity by 12.5%

[1 mark]

0.125 0.875 12.5 87.5

2 Simplify $(x^6)^3$

[1 mark]

x^2 x^9 x^{18} x^{216}

3 Circle the quadratic sequence.

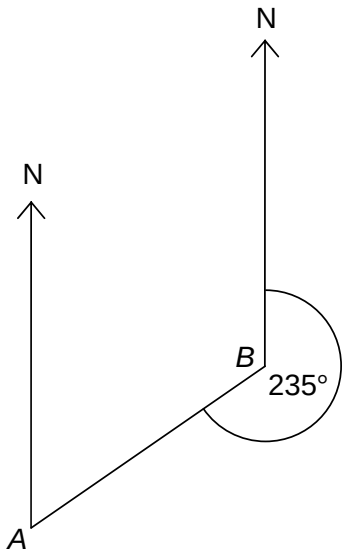
[1 mark]

2 8 14 22 1 8 27 64

2 4 8 16 1 4 9 16

4 The bearing of *A* from *B* is 235°

Not drawn accurately



Circle the bearing of *B* from *A*.

[1 mark]

055° 125° 145° 325°

Turn over for the next question

4

5 The direct route between two airports *A* and *B* is 450 km

An aircraft leaves *A* at 09.15

It arrives at *B* at 10.55

5 (a) Work out the average speed of the aircraft.

Assume the aircraft travelled the direct route.

[3 marks]

Answer _____ km/h

5 (b) In fact the aircraft did **not** travel the direct route.

How does this affect the average speed?

Tick a box

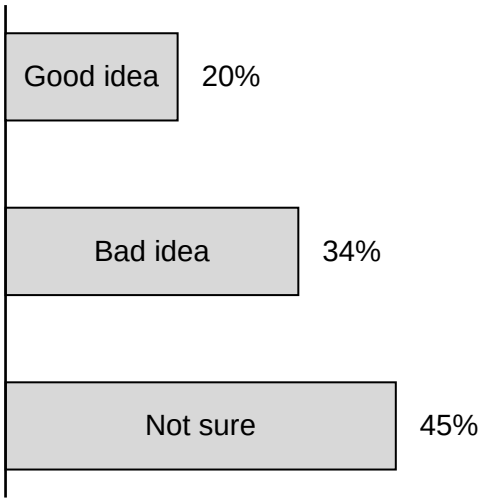
☐ Faster ☐ Slower ☐ The same

Give a reason for your answer.

[2 marks]

6 The diagram shows the results, to the nearest percentage, of a survey of 1000 motorists.

Driverless cars



Source: IAM Roadsmart survey April 2016

Work out the **largest** possible number of motorists who thought driverless cars were a good idea.

[2 marks]

Answer _____

Turn over for the next question

7

7 (a) Write these numbers in ascending order.

9812 9.82×10^2 9.81×10^3

[1 mark]

Answer _____, _____, _____

7 (b) Jon is multiplying two numbers given in standard form.

$2 \times 10^6 \times 3 \times 10^7 = (2 \times 3) \times 10^{(6 + 7)}$

$= 6 \times 10^{13}$

He says,

"So, for any numbers

$a \times 10^b \times c \times 10^d = (a \times c) \times 10^{(b + d)}$

which will **always** be in standard form."

Is he correct that $(a \times c) \times 10^{(b + d)}$ will **always** be in standard form?

Tick a box.

☐ Correct ☐ Not correct

Show working to support your answer.

[2 marks]

8 After landing, an aircraft is delayed in reaching its parking stand.

The aircraft uses 11.4 kg of fuel for each minute of delay.

1 litre of fuel is 0.82 kg

Fuel costs 65p per litre.

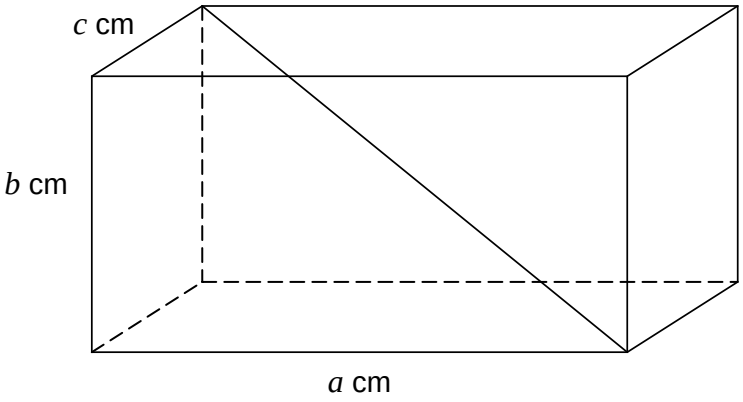
Work out the cost of a delay of 8 minutes.

[4 marks]

Answer £ _____

7

9 The diagram shows a cuboid and its diagonal.



The formula to work out the length of the diagonal in centimetres is

Length of diagonal = $\sqrt{a^2 + b^2 + c^2}$

9 (a) Work out the length of the diagonal when $a = 8$, $b = 3$ and $c = 2$

Give your answer to 2 significant figures.

[3 marks]

Answer _____ cm

9 (b) Work out the length of the diagonal in terms of a

when $b = 2a$ and $c = 2a$

[3 marks]

Answer _____ cm

10 Eva writes $4^2 \times 4^2 \times 4^2 = 4^{2 \times 2 \times 2}$

$= 4^8$

What is wrong with her method?

Give the correct answer.

[2 marks]

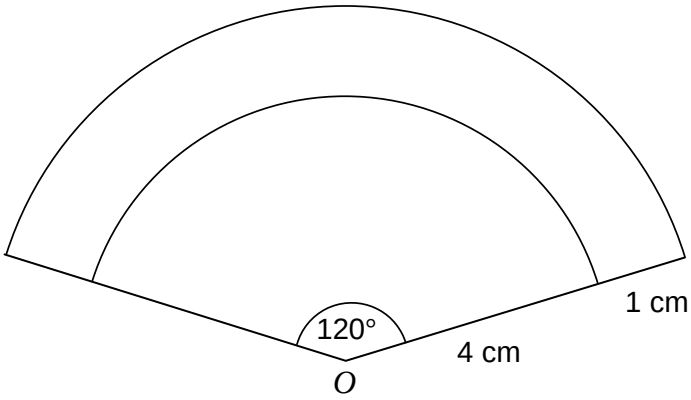
Answer _____

turn over for the next question

8

11 The diagram shows two circular arcs with centre O.

Not drawn accurately



How much longer is the big arc than the small arc?

Give your answer to 1 decimal place.

[4 marks]

Answer _____ cm

12 Solve the simultaneous equations

$3x + 2y = 10$

$3x - y = 13$

[3 marks]

Answer $x =$ _____ $y =$ _____

Turn over for the next question

7

13 P is the principal amount.

r is the interest rate over a given period.

n is the number of times that the interest is compounded.

Circle the expression for the total accrued using compound interest.

[1 mark]

$P\left(1+\frac{r}{100}\right)^n$

$P+\left(\frac{r}{100}\right)^n$

$P\left(1+\frac{n}{100}\right)^r$

$P\left(1+\frac{r^n}{100}\right)$

14 Rearrange the formula $v^2 = u^2 + 2as$ to make s the subject.

[2 marks]

Answer _____

15 Work out an approximate solution to $x^3 + 3x - 1 = 0$

Use the iteration $x_{n+1} = \dfrac{1}{x_n^2 + 3}$

Start with $x_1 = 1$

Give your answer to 2 decimal places.

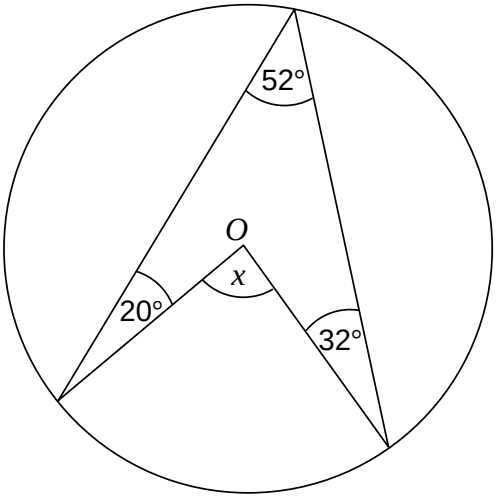
[3 marks]

Answer _____

Turn over for the next question

6

16 (a) Here is a circle, centre O.



Not drawn accurately

Work out the size of angle x.

Circle your answer.

[1 mark]

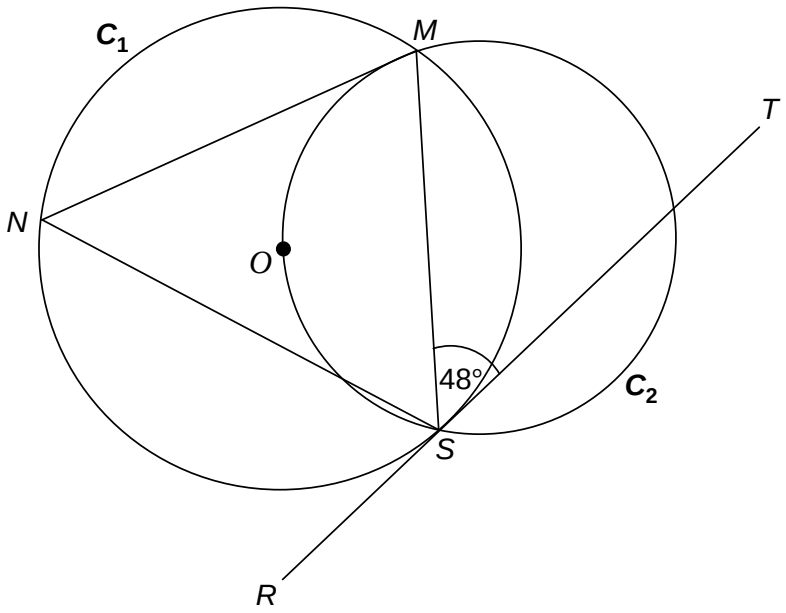
26° 72° 84° 90° 104°

16 (b) M, N and S are points on circle C_1

RST is a tangent to C_1

Circle C_2 passes through the centre O, S and M of circle C_1

Not drawn accurately



Prove that SM is **not** a diameter of circle C_2

Give reasons for your answer.

[3 marks]

4

17 The density of steel is between 7750 kg/m^3 and 8050 kg/m^3

1000 kg/m^3 = 1 g/cm^3

A solid metal object has a volume of 1430 cm^3

The mass of the object is 9.6 kg

Is it possible that it is made of steel?

Tick a box.

☐ Definitely steel ☐ Might be steel ☐ Definitely **not** steel

You **must** show your working.

[3 marks]

18 The following data is about the same types of plants.

Some of the plants are treated with plant food.

	Mean height (cm)	**Interquartile range (cm)**
Untreated	30.2	12.3
Treated	35.1	10.7

Compare the untreated plants and treated plants.

[2 marks]

Comparison 1 _____

_____

_____

Comparison 2 _____

_____

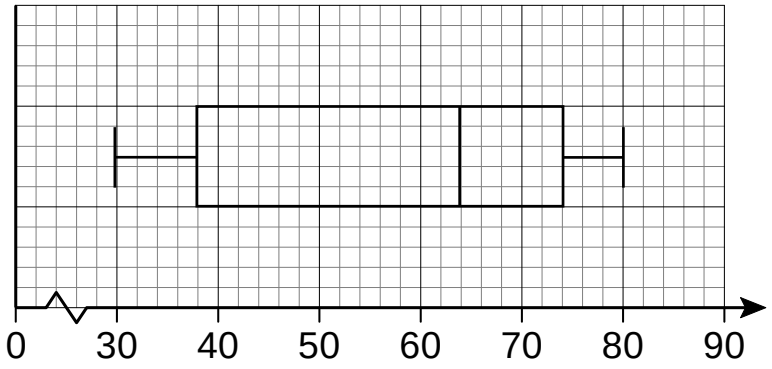
_____

Turn over for the next question

5

19 Here is a box plot.

Test scores



19 (a) Circle the value of the range.

[1 mark]

33 36 50 80

19 (b) Circle the value of the median.

[1 mark]

38 55 62 64

19 (c) Circle the value of the interquartile range.

[1 mark]

34 36 38 50 62

20 A knife is twice the cost of a spoon.

8 spoons and 12 knives cost £46.08

Work out the cost of 1 knife.

[5 marks]

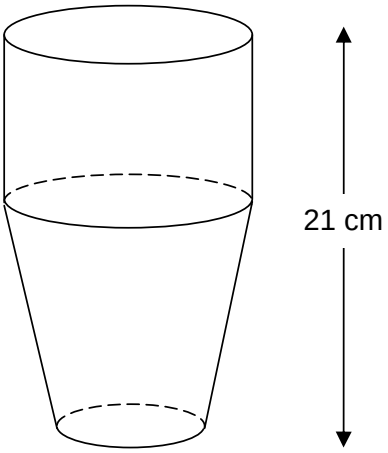
Answer £ _____

Turn over for the next question

8

21 The diagram shows an empty container of height 21 cm

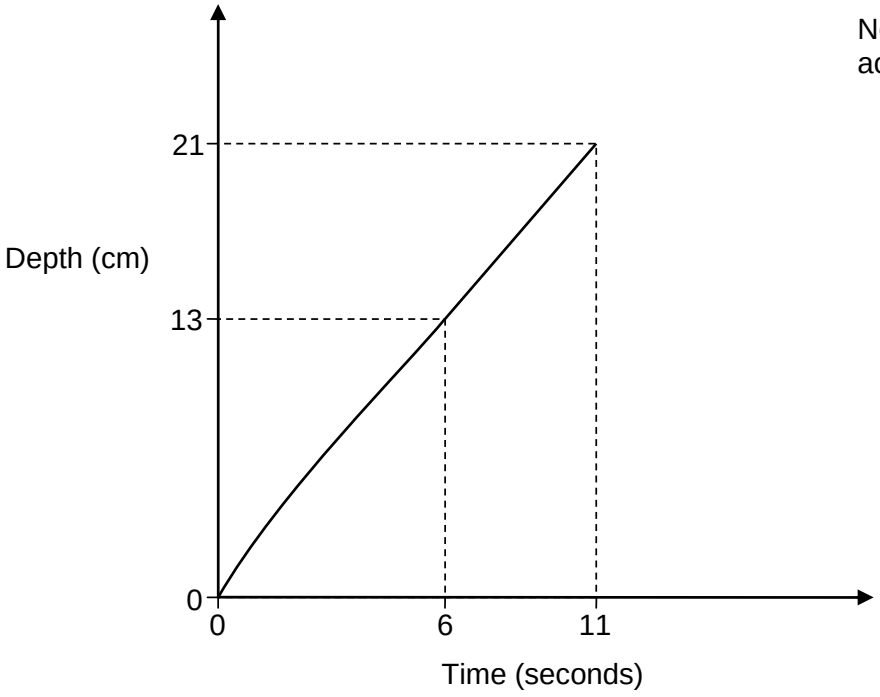
The container consists of a cylinder on a frustum of a cone.



Water is added to the container at a constant rate for 11 seconds.

The sketch graph shows the depth of the water as the container fills.

The graph is a curve for the first 6 seconds and a straight line for the next 5 seconds.



21 (a) Circle the height of the cylinder.

[1 mark]

8 cm 10.5 cm 13 cm 21 cm

21 (b) Work out the rate of increase of the depth of the water between 6 seconds and 11 seconds.

State the units of your answer.

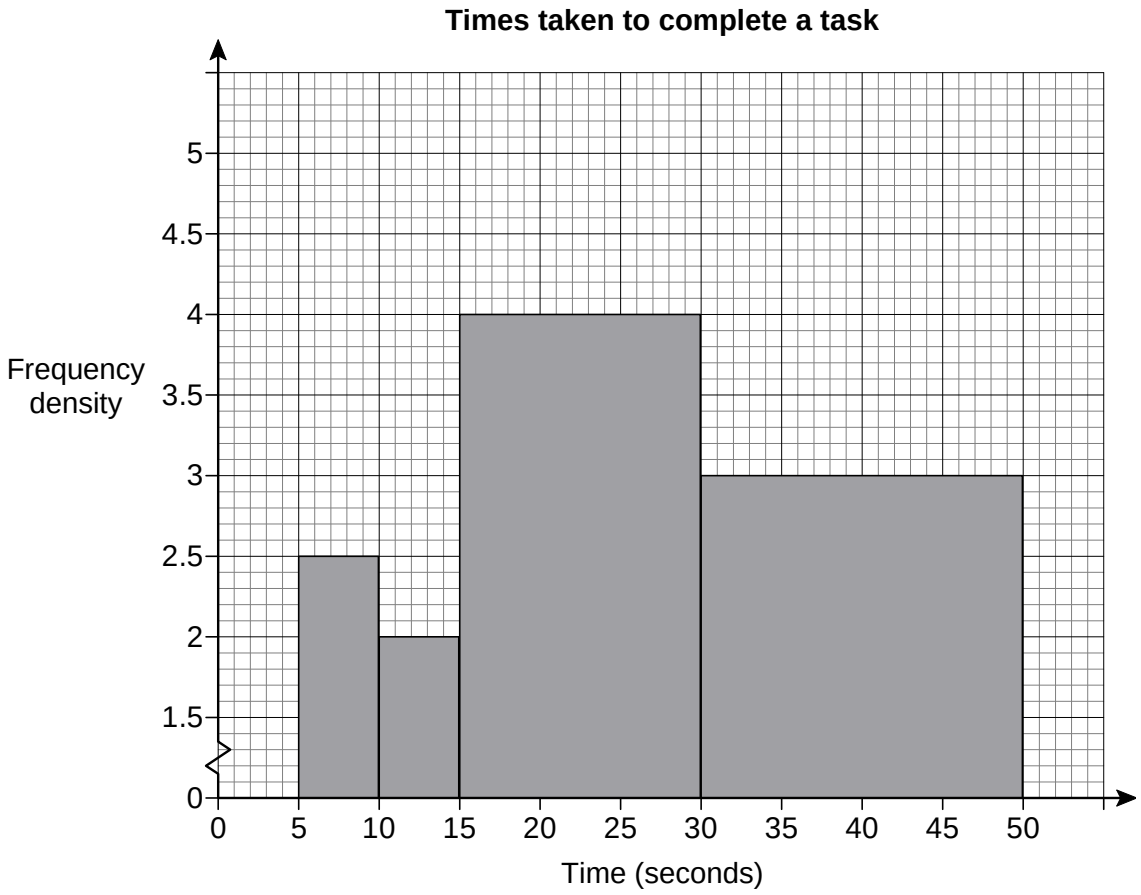
[3 marks]

Answer _____

Turn over for the next question

4

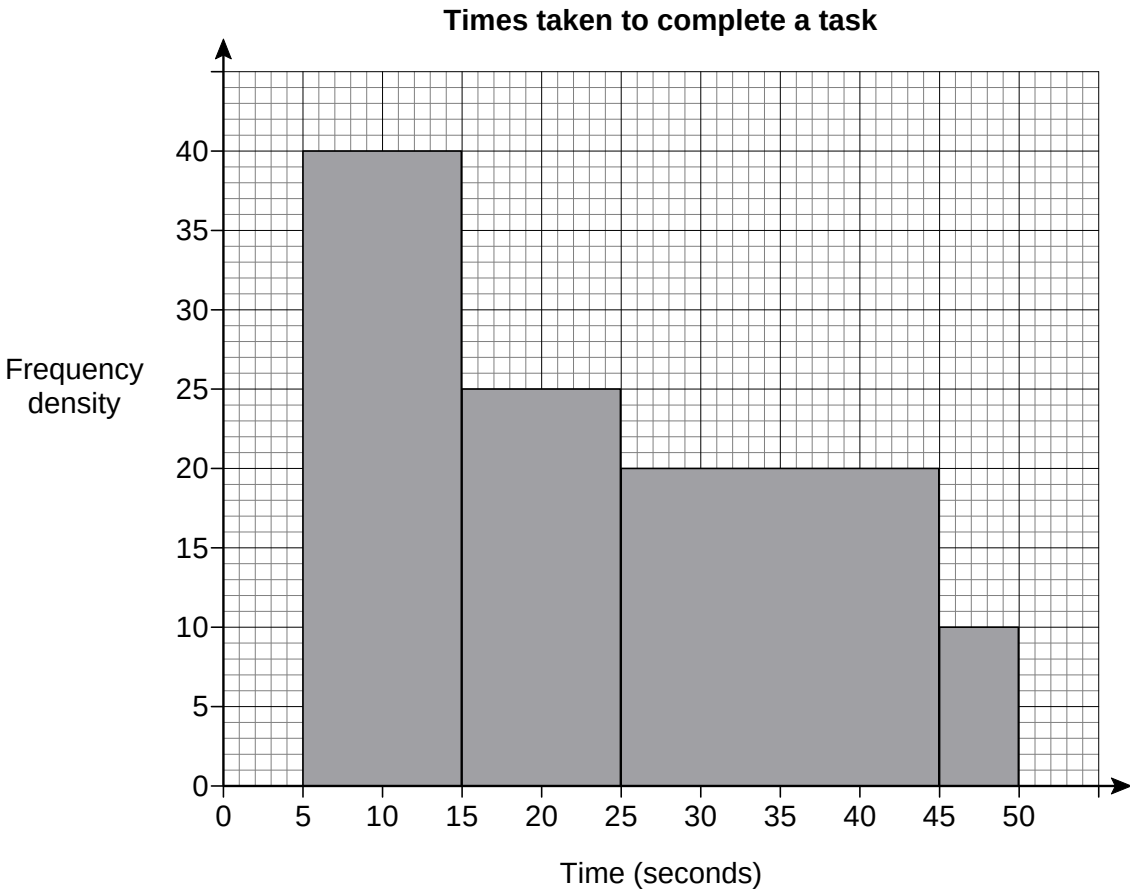
22 (a) Amy drew this histogram to show the times taken to complete a task.



Give **one** reason why it is misleading.

[1 mark]

22 (b) Here is another histogram showing the times taken to complete another task.



Estimate the percentage of people who took less than 30 seconds.

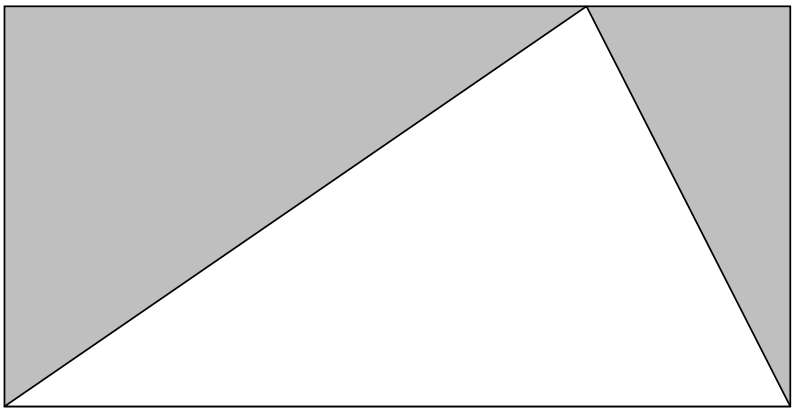
[5 marks]

Answer _____ %

6

23 The diagram shows a rectangle split into three triangles.

Not drawn accurately



$2x$ cm

$(3x + 1)$ cm

The **total** shaded area is 7.5 cm^2

Work out the value of x.

Give your answer to 1 decimal place.

[5 marks]

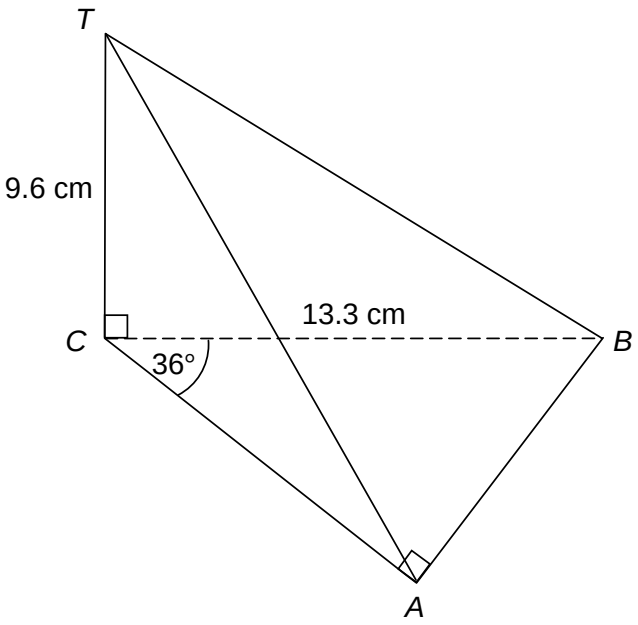
Answer _____

24 This 3D diagram represents a paperweight.

The horizontal base *ABC* is a right-angled triangle.

CT is vertical.

Angle *ACB* = 36°, *BC* = 13.3 cm and *CT* = 9.6 cm.



Work out the size of the angle between *AT* and the horizontal base.

[4 marks]

Answer _____ degrees

9

25 The number of bacteria, N, after t hours, of an experiment is given by

$$N = A \times 2^{\frac{t}{4}}$$ where A is constant.

25 (a) At the start of the experiment there are 250 bacteria.

Show that $A = 250$

[1 marks]

25 (b) How long is it before the number of bacteria doubles?

[2 marks]

Answer _____ hours

25 (c) Megan works out that there will be more than 1 million bacteria after 2 days.

Is she correct?

You **must** show your working**.**

[2 marks]

Answer _____

.**END OF QUESTIONS**

5

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