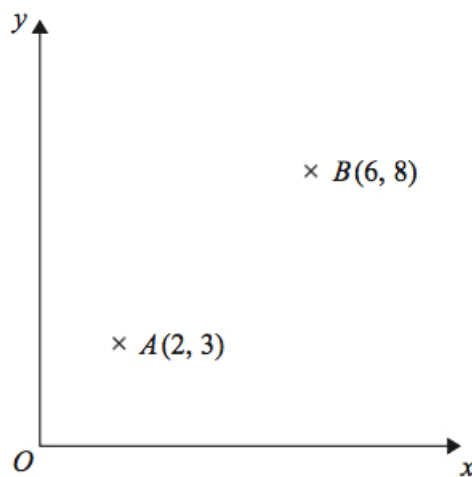


Dr Oliver Mathematics
GCSE Mathematics
2014 June Paper 2H: Calculator
1 hour 45 minutes

The total number of marks available is 100.
You must write down all the stages in your working.

1. The point A has coordinates $(2, 3)$. (2)
The point B has coordinates $(6, 8)$.



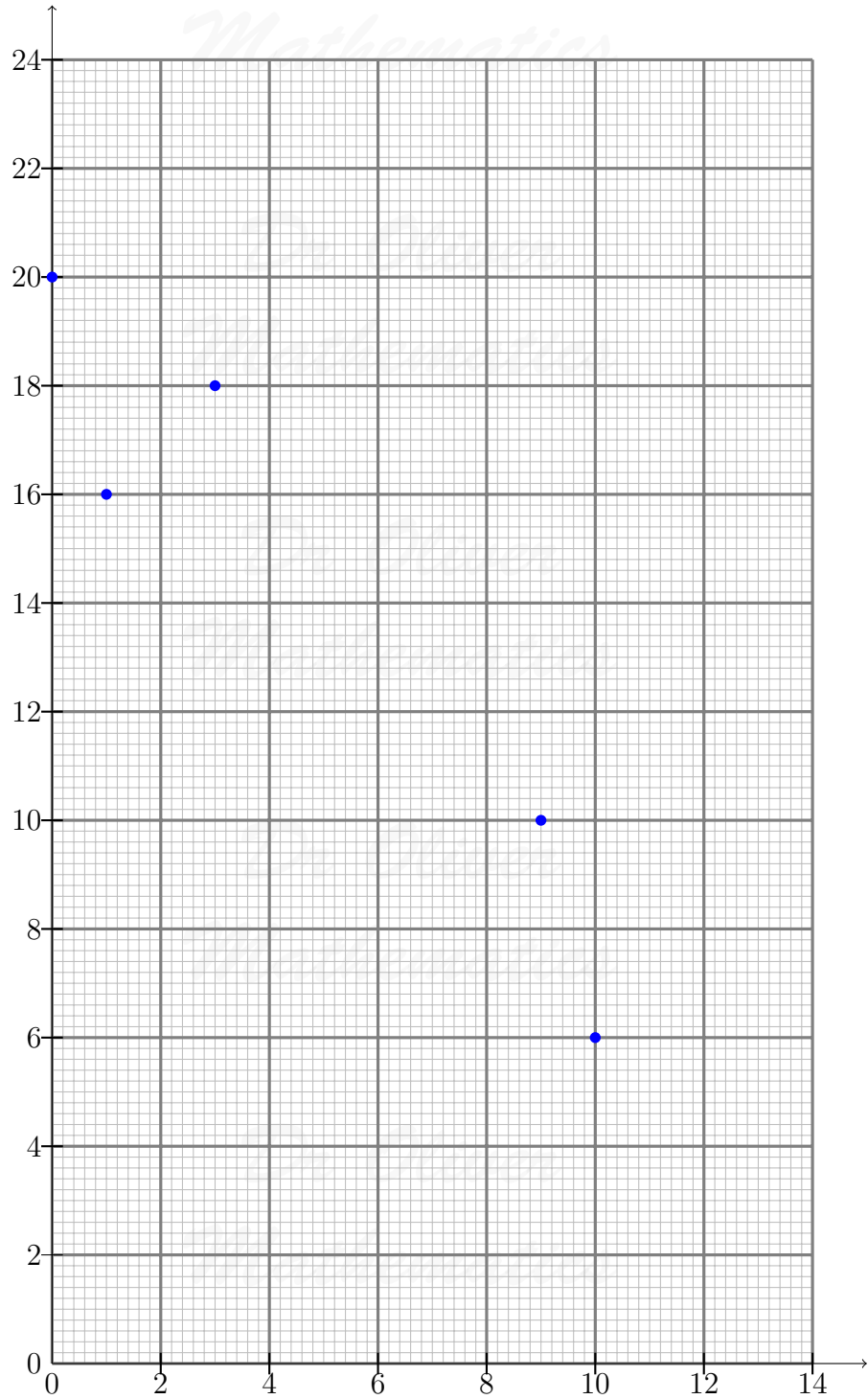
M is the midpoint of the line AB .

Find the coordinates of M .

2. The table shows the average temperature on each of seven days and the number of units of gas used to heat a house on these days.

Average temperature ($^{\circ}\text{C}$)	0	1	3	9	10	12	13
Units of gas used	20	16	18	10	6	6	2

Units of gas used



Average temperature (°C)

(a) Complete the scatter graph to show the information in the table.

(1)

The first 5 points have been plotted for you.

(b) Describe the relationship between the average temperature and the number of units of gas used. (1)

(c) Estimate the average temperature on a day when 12 units of gas are used. (2)

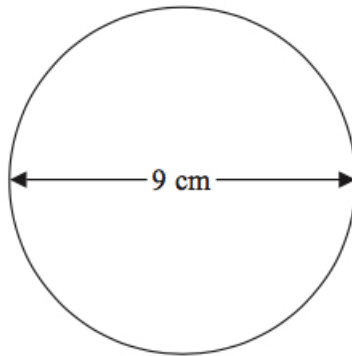
3. $x = 0.7$. (2)

Work out the value of

$$\frac{(x + 1)^2}{2x}.$$

Write down all the figures on your calculator display.

4. Here is a circle. (2)

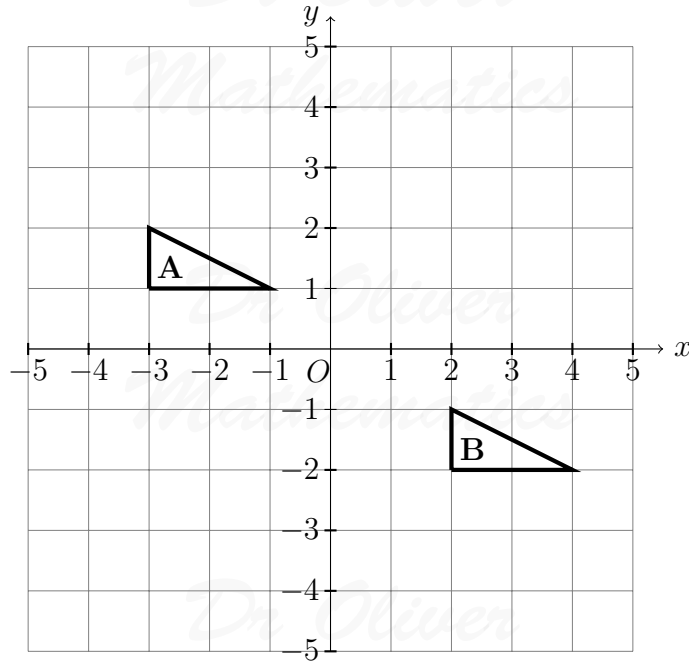


The diameter of the circle is 9 cm.

Work out the circumference of this circle.

Give your answer correct to 3 significant figures.

5. Describe the single transformation that maps triangle **A** onto triangle **B**. (2)



6. Sue is driving home from her friend's house. (3)

Sue drives 10 miles from her friend's house to the motorway, 240 miles on the motorway, and 5 miles from the motorway to her home.

Sue takes 20 minutes to drive from her friend's house to the motorway, drives at an average speed of 60 mph on the motorway, and takes 25 minutes to drive from the motorway to her home.

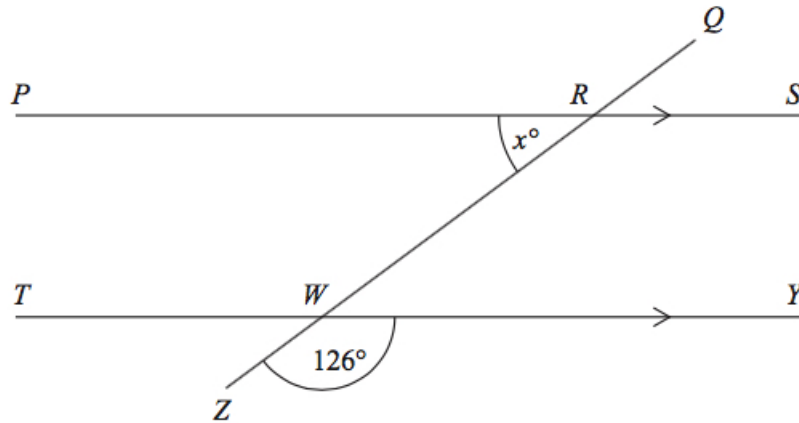
Sue stops for a 30 minute rest on her drive home.

Sue leaves her friend's house at 9.00 am.

What time does Sue get home?

You must show all your working.

7. PRS and TWY are parallel straight lines. (3)
 $QRWZ$ is a straight line.



Work out the value of x .
Give reasons for your answer.

8. Lorna carries out a survey about the number of times customers go to a shop.
She asks at random 100 customers how many times they went to the shop last month.
The table shows Lorna's results.

Number of times	0	1	2	3	4	5	6	more than 6
Frequency	4	12	13	17	25	13	11	5

One of the 100 customers is chosen at random.

- (a) What is the probability that this customer went to the shop 5 or more times? (2)

Last month the shop had a total of 1 500 customers.

- (b) Work out an estimate for the number of customers who went to the shop exactly 2 times last month. (2)

The owner of a different shop is carrying out a survey on the ages of his customers.
He records the ages of the first 10 customers in his shop after 9 am one morning.

- (c) This may **not** be a suitable sample. (2)
Give **two** reasons why.

9. The diagram shows a trapezium. (4)

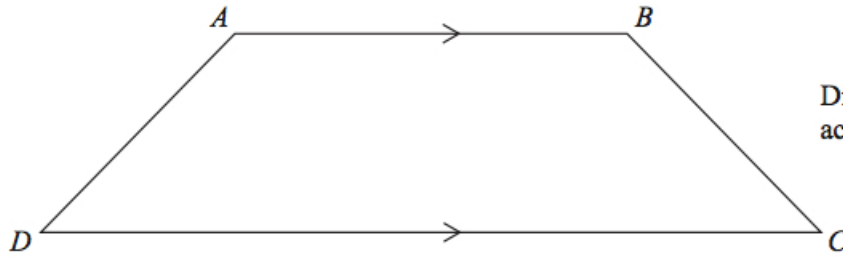


Diagram NOT accurately drawn

$AD = x$ cm.

BC is the same length as AD .

AB is twice the length of AD .

DC is 4 cm longer than AB .

The perimeter of the trapezium is 38 cm.

Work out the length of AD .

10. (a) Simplify

$(p^3)^2$.

(1)

- (b) Simplify

$\frac{t^8}{t^3}$.

(1)

$2^3 \times 2^n = 2^9$.

- (c) Work out the value of n .

(1)

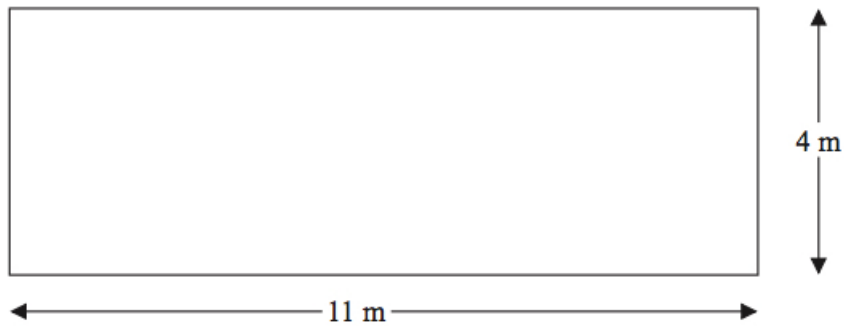
$2x^3 = 128$.

- (d) Work out the value of x .

(1)

11. Here is a plan of Martin's driveway.

(5)



Martin is going to cover his driveway with gravel.
The gravel will be 6 cm deep.

Gravel is sold in bags.
There are 0.4 m^3 of gravel in each bag.
Each bag of gravel costs £38.

Martin gets a discount of 30% off the cost of the gravel.

Work out the total amount of money Martin pays for the gravel.

12. Here are the first five terms of an arithmetic sequence.

4 9 14 19 24

- (a) Find, in terms of n , an expression for the n th term of this sequence. (2)

Here are the first five terms of a different sequence.

2 2 0 -4 -10

An expression for the n th term of this sequence is $3n - n^2$.

- (b) Write down, in terms of n , an expression for the n th term of a sequence whose first five terms are (1)

4 4 0 -8 -20

13. $-5 < y \leq 0$.
 y is an integer.

- (a) Write down all the possible values of y . (2)
(b) Solve (2)

$$6(x - 2) > 15.$$

14. Ali is planning a party. (5)

He wants to buy some cakes and some sausage rolls.

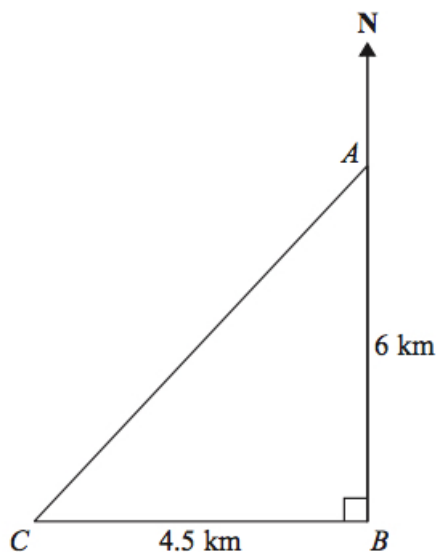
The cakes are sold in boxes.
There are 12 cakes in each box.
Each box of cakes costs £2.50.

The sausage rolls are sold in packs.
There are 8 sausage rolls in each pack.
Each pack of sausage rolls costs £1.20.

Ali wants to buy more than 60 cakes and more than 60 sausage rolls.
He wants to buy exactly the same number of cakes as sausage rolls.

What is the least amount of money Ali will have to pay?

15. The diagram shows the positions of three turbines A , B , and C .



A is 6 km due north of turbine B .
 C is 4.5 km due west of turbine B .

(a) Calculate the distance AC . (3)

(b) Calculate the bearing of C from A . (4)

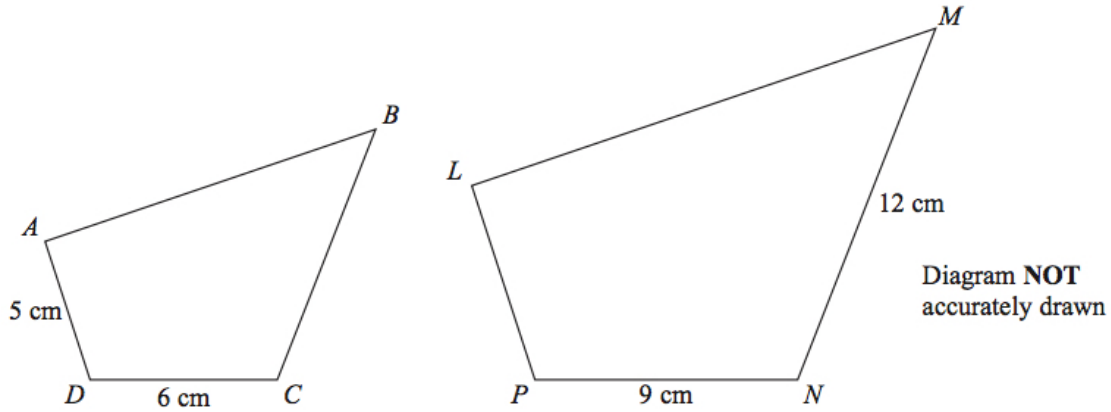
Give your answer correct to the nearest degree.

16. Work out the value of (2)

$$(7.5 \times 10^4) \times (2.5 \times 10^3).$$

Give your answer in standard form.

17. Quadrilaterals $ABCD$ and $LMNP$ are mathematically similar.



Angle $A =$ angle L .

Angle $B =$ angle M .

Angle $C =$ angle N .

Angle $D =$ angle P .

- (a) Work out the length of LP . (2)
- (b) Work out the length of BC . (2)

18. Katie invests £200 in a savings account for 2 years.

The account pays compound interest at an annual rate of 3.3% for the first year and 1.5% for the second year.

- (a) Work out the total amount of money in Katie's account at the end of 2 years. (3)

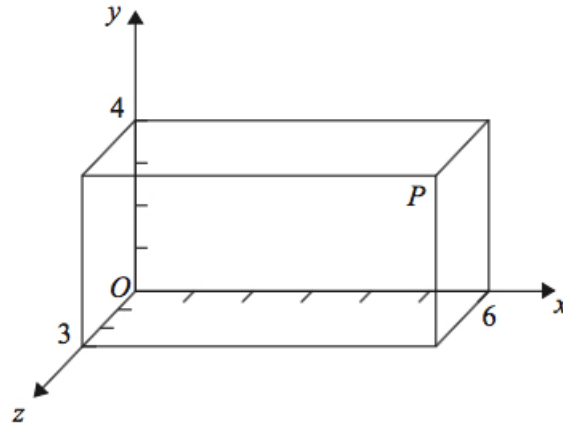
Katie travels to work by train.

The cost of her weekly train ticket increases by 12.5% to £225.

Katie's weekly pay increases by 5% to £535.50.

- (b) Compare the increase in the amount of money Katie has to pay for her weekly train ticket with the increase in her weekly pay. (3)

19. Here is a cuboid drawn on a 3-D grid. (2)



P is a vertex of the cuboid.

T divides the line OP in the ratio $1 : 2$.

Find the coordinates of T .

20. 25 students in class A did a science exam. (3)
 30 students in class B did the same science exam.

The mean mark for the 25 students in class A is 67.8

The mean mark for all the 55 students is 72.0.

Work out the mean mark for the students in class B.

21. (a) Expand and simplify $(y - 2)(y - 5)$. (2)

- (b) Prove algebraically that (3)

$$(2n + 1)^2 - (2n + 1) \text{ is an even number}$$

for all positive integer values of n .

22. Shabeen has a biased coin. (3)
 The probability that the coin will land on heads is 0.6.

Shabeen is going to throw the coin 3 times.

She says the probability that the coin will land on tails 3 times is less than 0.1.

Is Shabeen correct?

You must show all your working.

23. (a) Explain what is meant by a stratified sample. (1)

The table shows information about the ages of the people living in a village.

Age group	Number of people
Under 21	72
21 – 40	90
41 – 60	123
Over 60	314

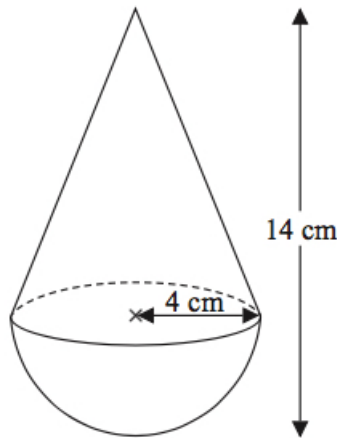
Mrs Parrish carries out a survey of these people.
She uses a sample size of 50 people stratified by age group.

- (b) Work out the number of people over 60 years of age in the sample. (2)
24. p is inversely proportional to t . (3)

When $t = 4$, $p = 12$.

Find the value of p when $t = 6$.

25. The diagram shows a solid made from a hemisphere and a cone. (3)



The radius of the hemisphere is 4 cm.
The radius of the base of the cone is 4 cm.

Calculate the volume of the solid.
Give your answer correct to 3 significant figures.

26. Solve the equations

(5)

$$x^2 + y^2 = 36$$

$$x = 2y + 6.$$

27. $ABCD$ is a parallelogram.

(5)

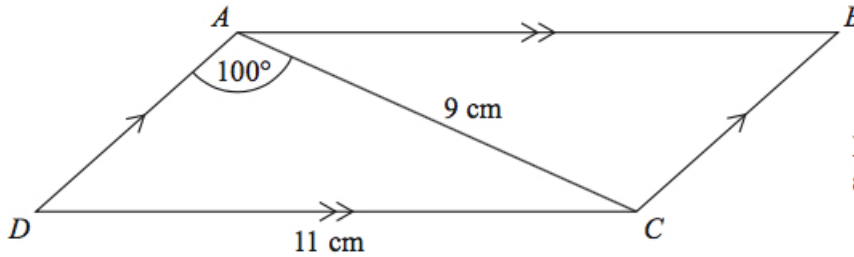


Diagram **NOT** accurately drawn

$$AC = 9 \text{ cm.}$$

$$DC = 11 \text{ cm.}$$

$$\text{Angle } DAC = 100^\circ.$$

Calculate the area of the parallelogram.

Give your answer correct to 3 significant figures.