

Dr Oliver Mathematics
GCSE Mathematics
2019 November Paper 2H: Calculator
1 hour 30 minutes

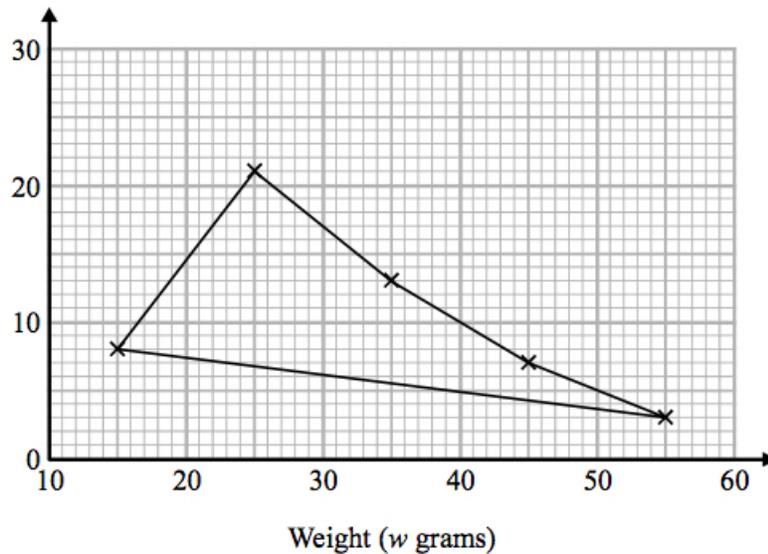
The total number of marks available is 80.

You must write down all the stages in your working.

1. The table shows some information about the weights of 50 potatoes. (2)

| Weight (w grams) | Frequency |
|---------------------|-----------|
| $10 < w \leq 20$ | 6 |
| $20 < w \leq 30$ | 21 |
| $30 < w \leq 40$ | 13 |
| $40 < w \leq 50$ | 7 |
| $50 < w \leq 60$ | 3 |

Iveta drew this frequency polygon for the information in the table. The frequency polygon is not fully correct.



Write down **two** things that are wrong with the frequency polygon.

2. The length of a pencil is 128 mm correct to the nearest millimetre. (2)

Complete the error interval for the length of the pencil.

3. Tom and Adam have a total of 240 stamps. (4)
The ratio of the number of Tom's stamps to the number of Adam's stamps is 3 : 7.

Tom buys some stamps from Adam.

The ratio of the number of Tom's stamps to the number of Adam's stamps is now 3 : 5.

How many stamps does Tom buy from Adam?

You must show all your working.

4. Each person in a fitness club is going to get a free gift.
Stan is going to order the gifts.

Stan takes a sample of 50 people in the fitness club.

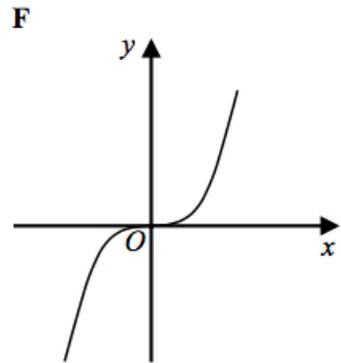
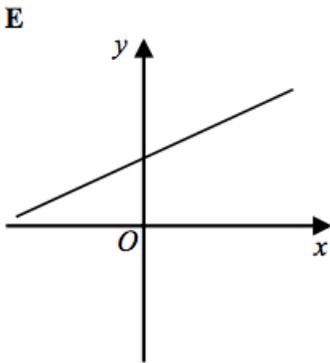
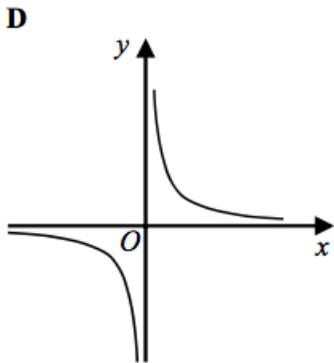
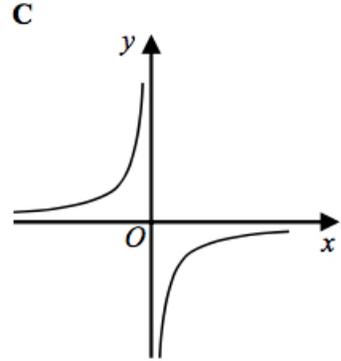
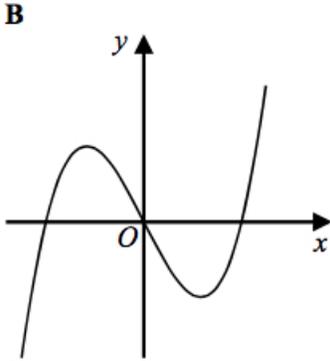
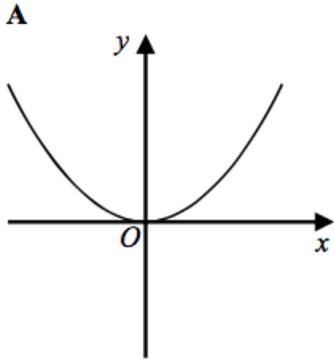
He asks each person to tell him the gift they would like.

The table shows information about his results.

| Gift | Number of people |
|------------|------------------|
| Sports bag | 17 |
| Gym towel | 7 |
| Headphones | 11 |
| Voucher | 15 |

There are 700 people in the fitness club.

- (a) Work out how many sports bags Stan should order. (2)
- (b) Write down any assumption you made **and** explain how this could affect your answer. (1)
5. Here are six graphs.



Write down the letter of the graph that could have the equation

(a) $y = x^3$ (1)

(b) $y = \frac{1}{x}$. (1)

6. The n th term of a sequence is (3)

$$2n^2 - 1.$$

The n th of a different sequence is

$$40 - n^2.$$

Show that there is only one number that is in both of these sequences.

7. Work out (2)

$$(3.42 \times 10^{-7}) \div (7.5 \times 10^{-6}).$$

Give your answer in standard form.

8. The number of days, d , that it will take to build a house is given by (3)

$$d = \frac{720}{n},$$

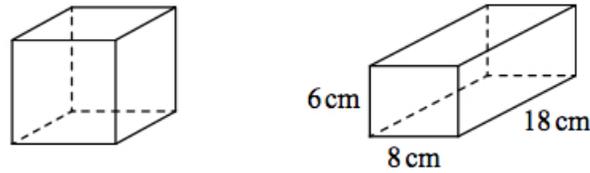
where n is the number of workers used each day.

Ali's company will take 40 days to build the house.
Hayley's company will take 30 days to build the house.

Hayley's company will have to use more workers each day than Ali's company.

How many more?

9. The diagram shows a cube and a cuboid. (5)



The total surface area of the cube is equal to the total surface area of the cuboid.

Janet says, "The volume of the cube is equal to the volume of the cuboid."

Is Janet correct?

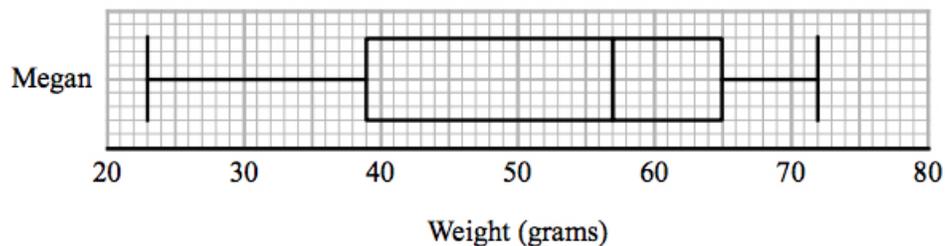
You must show how you get your answer.

10. Make k the subject of the formula (2)

$$y = \sqrt{2m - k}.$$

11. Megan grows potatoes.

The box plot below shows information about the weights of Megan's potatoes.

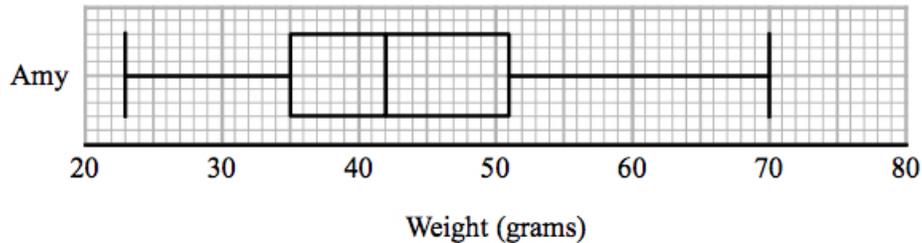


Megan says that half of her potatoes weigh less than 50 grams each.

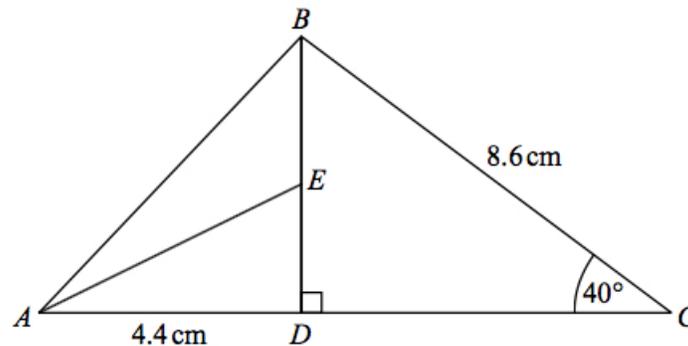
- (a) Is Megan correct? (1)
Give a reason for your answer.

Amy also grows potatoes.

The box plot below shows information about the weights of Amy's potatoes.



- (b) Compare the distribution of the weights of Megan's potatoes with the distribution of the weights of Amy's potatoes. (2)
12. The diagram shows triangle ABC . (4)



ADC and DEB are straight lines.

$$AD = 4.4 \text{ cm.}$$

$$BC = 8.6 \text{ cm.}$$

E is the midpoint of DB .

$$\text{Angle } CDB = 90^\circ.$$

$$\text{Angle } DCB = 40^\circ.$$

Work out the size of angle EAD .

Give your answer correct to 1 decimal place.

You must show all your working.

13. Sakira invested £3 550 in a savings account for 3 years. (3)

She was paid 2.6% per annum compound interest for each of the first 2 years.
She was paid $R\%$ interest for the third year.

Sakira had £3 819.21 in her savings account at the end of the 3 years.

Work out the value of R .

Give your answer correct to 1 decimal place.

14. Sadia is going to buy a new car. (2)

For the car, she can choose one body colour, one roof colour, and one wheel type.

She can choose from

- 19 different body colours and
- 25 different wheel types.

The total number of ways Sadia can choose the body colour and the roof colour and the wheel type is 3 325.

Work out the number of different roof colours that Sadia can choose from.

15. Expand and simplify (3)

$$(3x + 2)(2x + 1)(x - 5).$$

16. Marek has 9 cards. (3)

There is a number on each card.



Marek takes at random two of the cards.

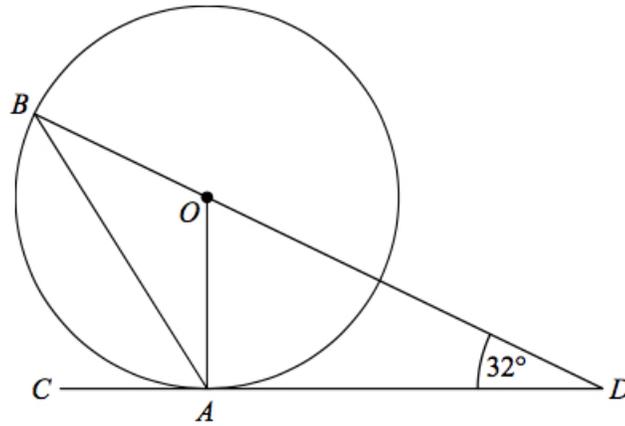
He works out the product of the numbers on the two cards.

Work out the probability that the product is an even number.

17. A and B are points on a circle with centre O . (3)

CAD is the tangent to the circle at A .

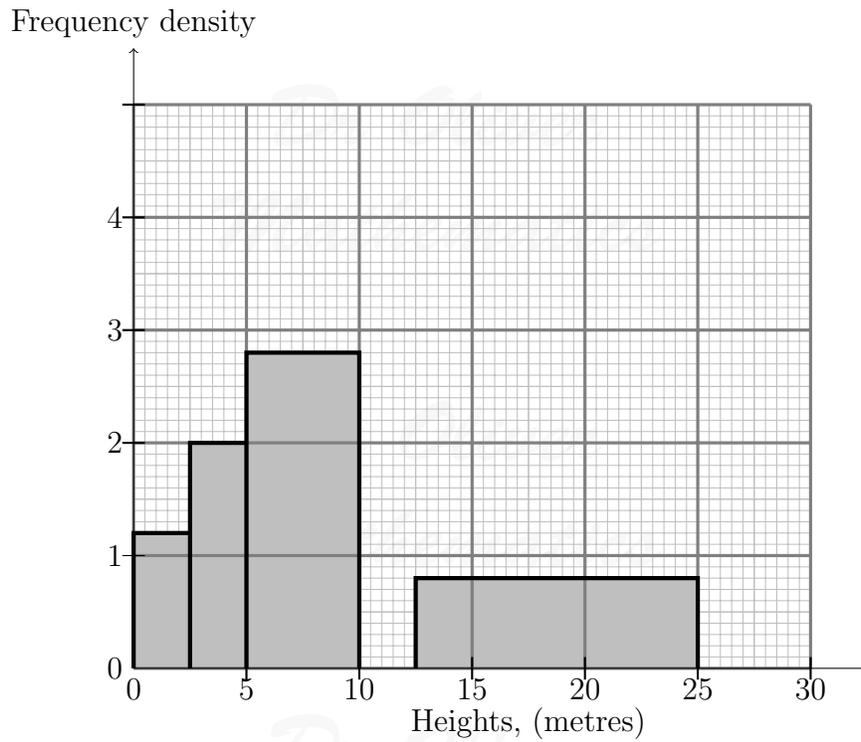
BOD is a straight line.



Angle $ODA = 32^\circ$.

Work out the size of angle CAB .
You must show all your working.

18. The histogram gives information about the heights, in metres, of the trees in a park. (3)
The histogram is incomplete.



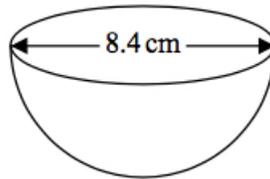
20% of the trees in the park have a height between 10 metres and 12.5 metres.

None of the trees in the park have a height greater than 25 metres.

Complete the histogram.

19. The diagram shows a hemisphere with diameter 8.4 cm.

(2)



Work out the volume of the hemisphere.
Give your answer correct to 3 significant figures.

- 20.

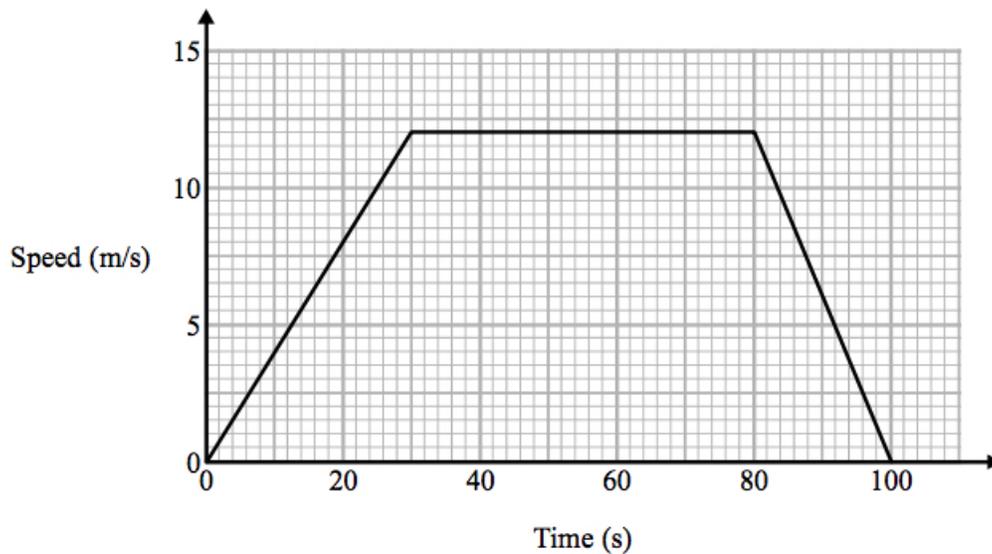
$$d = \frac{1}{8}c^3.$$

(4)

$c = 10.9$, correct to 3 significant figures.

By considering bounds, work out the value of d to a suitable degree of accuracy.
Give a reason for your answer.

21. Here is a speed-time graph for a train journey between two stations.
The journey took 100 seconds.



- (a) Calculate the time taken by the train to travel half the distance between the two stations. (4)

You must show all your working.

- (b) Compare the acceleration of the train during the first part of its journey with the acceleration of the train during the last part of its journey. (1)

22. The number of rabbits on a farm at the end of month n is P_n .

The number of rabbits at the end of the next month is given by

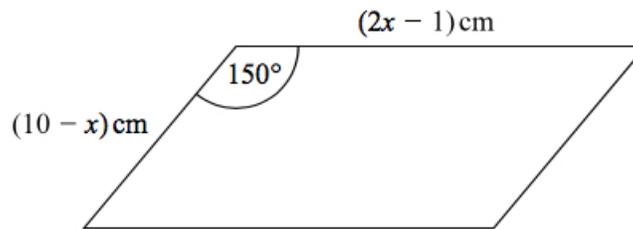
$$P_{n+1} = 1.2P_n - 50.$$

At the end of March there are 200 rabbits on the farm.

- (a) Work out how many rabbits there will be on the farm at the end of June. (3)

- (b) Considering your results in part (a), suggest what will happen to the number of rabbits on the farm after a long time. (1)

23. The diagram shows a parallelogram.



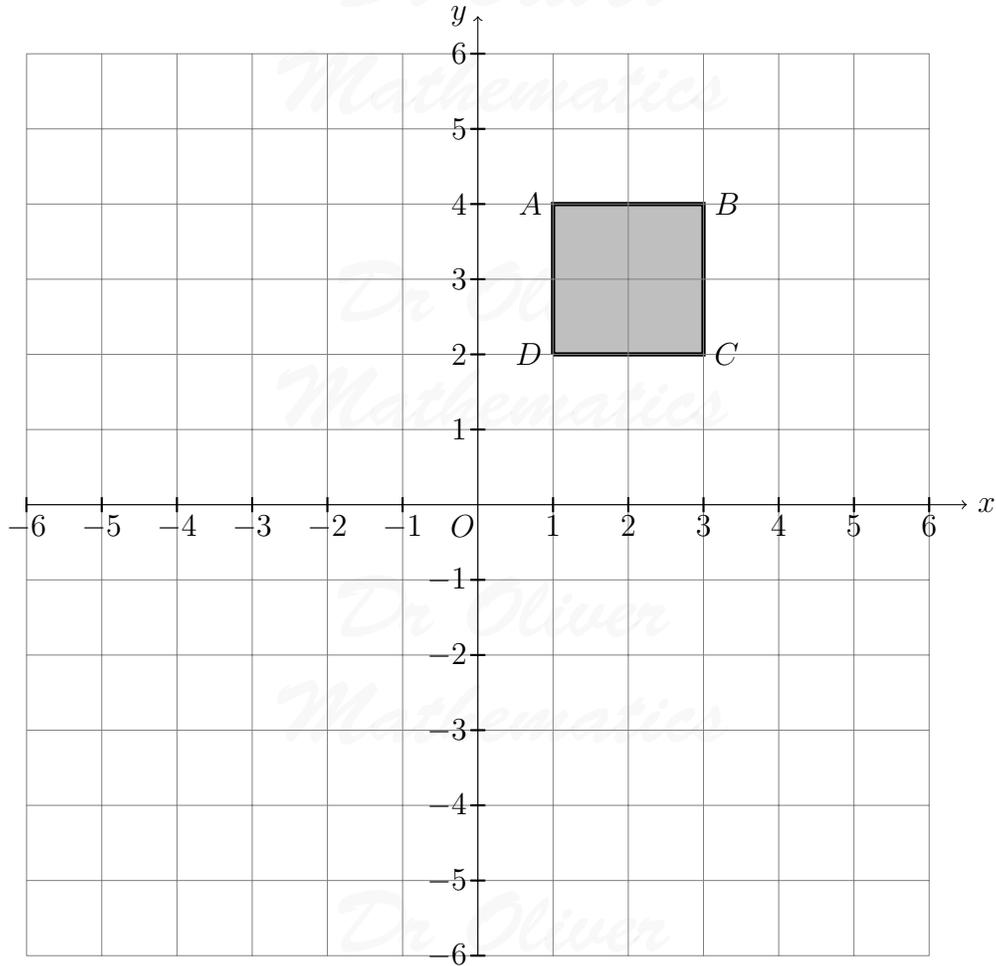
The area of the parallelogram is greater than 15 cm^2 .

- (a) Show that (3)

$$2x^2 - 21x + 40 < 0.$$

- (b) Find the range of possible values of x . (3)

24. Square $ABCD$ is transformed by a combined transformation of a reflection in the line $x = -1$ followed by a rotation. (2)



Under the combined transformation, two vertices of the square $ABCD$ are invariant.

Describe fully one possible rotation.

25. The straight line L has equation

$$3x + 2y = 17.$$

(5)

The point A has coordinates $(0, 2)$.

The straight line M is perpendicular to L and passes through A .

Line L crosses the y -axis at the point B .

Lines L and M intersect at the point C .

Work out the area of triangle ABC .

You must show all your working.