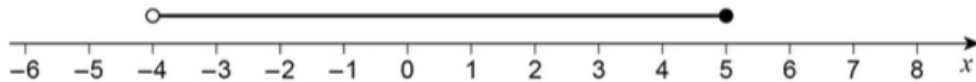


Dr Oliver Mathematics
AQA GCSE Mathematics
2017 November Paper 3: Calculator
1 hour 30 minutes

The total number of marks available is 80.

You must write down all the stages in your working.

1. Circle the inequality shown by the diagram. (1)



$-4 \leq x < 5$ $-4 \leq x \leq 5$ $-4 < x < 5$ $-4 < x \leq 5$.

2. y is 100% more than x . (1)

Circle the ratio $x : y$.

$1 : 100$ $100 : 1$ $1 : 2$ $2 : 1$.

3. The first four terms of a sequence are (1)

-10 -8 -6 -4 .

Circle the expression for the n th term of the sequence.

$-12 - 2n$ $-8 - 2n$ $n + 2$ $2n - 12$.

4. Circle the equation of the line that is parallel to the x -axis. (1)

$y = -5$ $x - y = 0$ $x = 3$ $x + y = 0$.

5. Multiply out and simplify (2)

$(x - 8)^2$.

6. Show that 268 can be written as the sum of a power of 3 and a square number. (2)

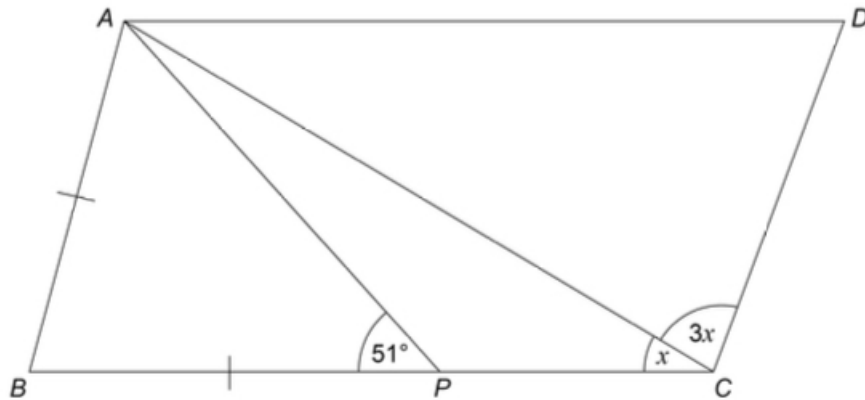
7. Here is some information about the times taken by 40 people to fill in a form. (1)

Time, t minutes	Number of people
$0 < t \leq 5$	3
$5 < t \leq 10$	9
$10 < t \leq 15$	11
$15 < t \leq 20$	17

In which class interval is the median?
Circle your answer.

$0 < t \leq 5$ $5 < t \leq 10$ $10 < t \leq 15$ $15 < t \leq 20$.

8. $ABCD$ is a parallelogram. (4)
 $AB = BP$.



Work out the size of angle x .

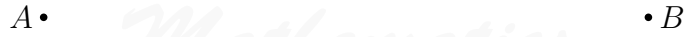
9. (a) Rearrange (2)
 $v = u + at$

to make t the subject of the formula.

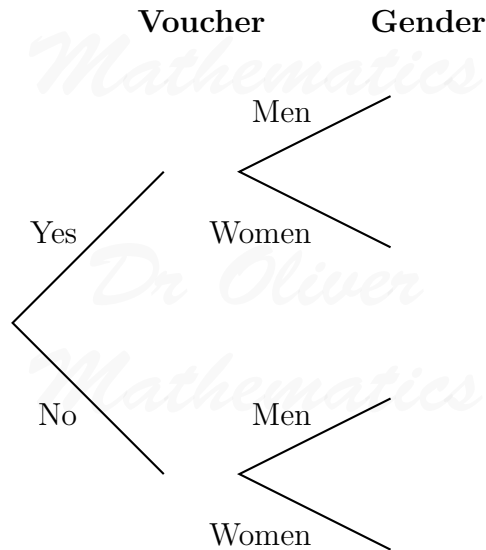
- (b) Complete this table with consistent metric units. (2)

Distance	Time	Speed	Acceleration
m	s		

10. Construct a locus of points that are the same distance from points A and B . (2)



11.
 - 42 men and 38 women visit a restaurant.
 - 44 of these people have a voucher.
 - Three times as many men as women do **not** have a voucher.
 (a) Complete the frequency tree. (4)



A voucher takes **15%** off the bill.
 After using the voucher, the bill for a meal is £27.20.

(b) How much was the bill before using the voucher? (3)

12. The distance by road from Newport to London is 140 miles.

- Tom travels by coach from Newport to London.
- The coach leaves Newport at 1.30 pm

He assumes the coach will travel at an average speed of 50 mph.

(a) Use his assumption to work out the arrival time in London. (3)

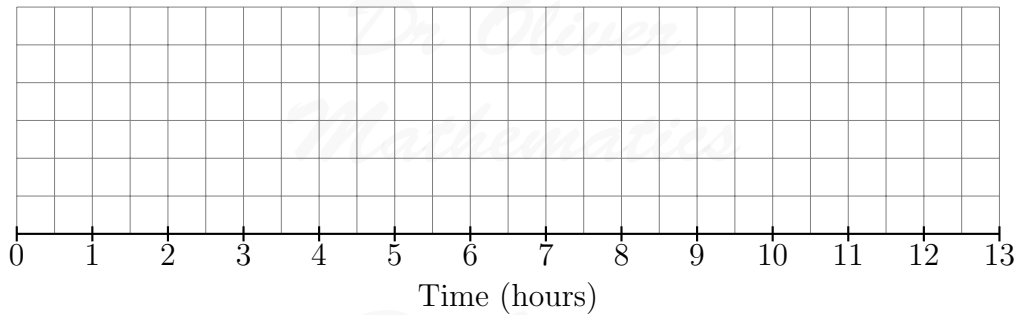
In fact, the coach has a lower average speed.

(b) How does this affect the arrival time? (1)

13. Here is some information about the length of time cars stayed in a car park. (3)

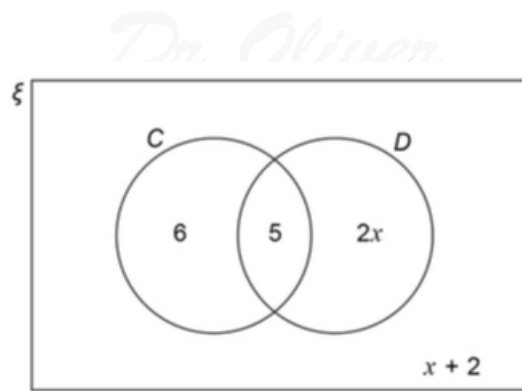
Shortest time	30 minutes
Longest time	12 hours
Lower quartile	2 hours
Interquartile range	3 hours
Median time	4 hours

Draw a box plot to show this information.



14. In the Venn diagram,

- \mathcal{E} represents 31 students in a class,
- C is students who have a cat, and
- D is students who have a dog,



One student from the class is picked at random.

- (a) Work out the probability that the student has a dog. (3)

One of the students who has a cat is picked at random.

- (b) Work out the probability that this student has a dog. (1)

15. Circle the highest common factor (HCF) of $6xy^2$ and $4x^3y$. (1)

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$2xy^2$ $2xy$ $12x^3y^2$ $24x^4y^3$.

16. (1)

$$f(x) = x^2 - x^3.$$

Circle the value of $f(-3)$.

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18 - 18 36 - 36.

17. At a football game, (3)

number of men : number of women : number of children = 13 : 5 : 7.

There are 4152 **more** men than women.

Work out the number of children at the game.

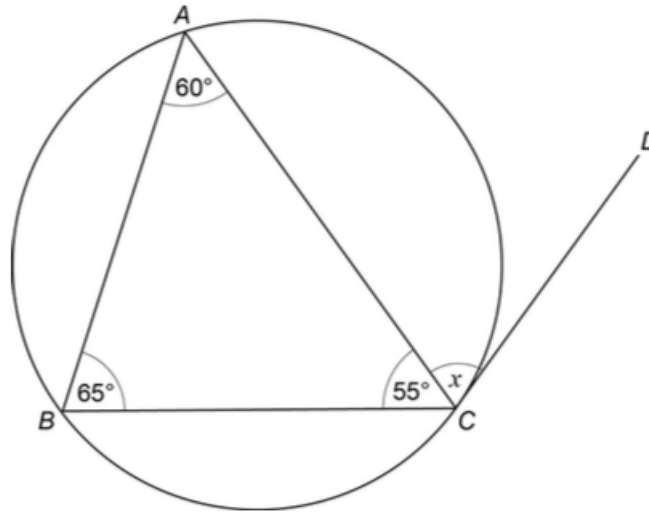
18. Expand and simplify (4)

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$(3x^2 + 2)(2x + 5) - 6x(x^2 - 3)$.

19. A , B , and C are points on a circle. (2)

CD is a tangent to the circle.



Write down the size of angle x .
Give a reason for your answer.

20.
 - w is a positive number.
 - x is 10% more than w .
 - y is 10% less than x .

(1)

Which statement is true?
Tick **one** box.

$w < x$ and $w < y$

$w < x$ and $w = y$

$x > y$ and $w > y$

$x > y$ and $w = y$

21. N is a number.

(3)

As a product of prime factors in index form

$$N = 2 \times 3^4 \times y^3.$$

Work out

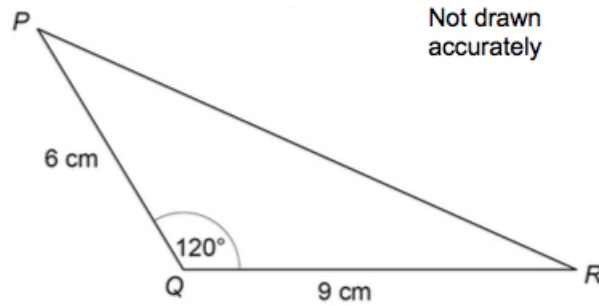
$$3N^2$$

as a product of prime factors in index form.

Give your answer in terms of y .

22. Here is a triangle.

(3)

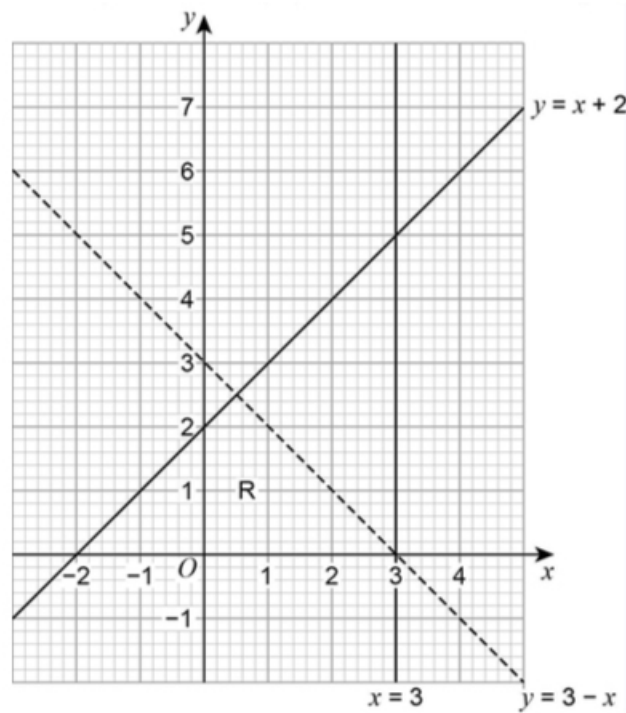


Work out the length PR .

23. Joe draws this graph to identify the region R represented by

(2)

$$y \leq x + 2, y > 3 - x, \text{ and } x < 3.$$



Make **two** criticisms of his graph.

24.

$$a : b = 9 : 4 \text{ and } 10b = 7c.$$

(3)

Work out

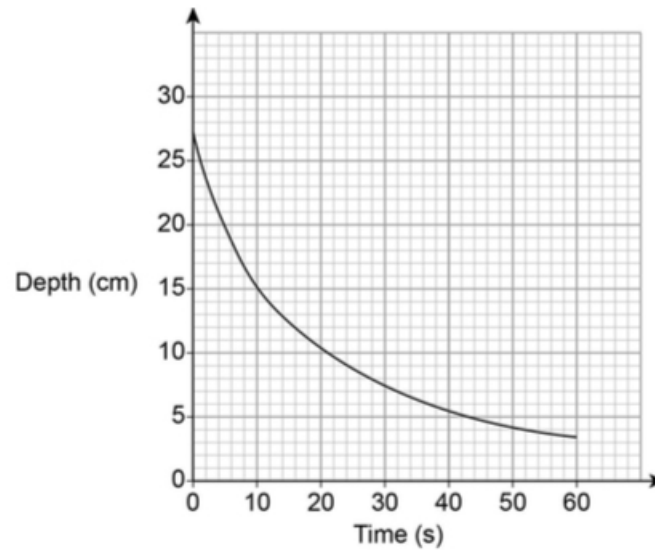
$$a : c$$

in its simplest form.

25. Liquid is leaking out of a container.

The graph shows the depth of the liquid for 60 seconds.

(3)



Use the graph to work out an estimate of the rate of decrease of depth at 10 seconds.
You **must** show your working.

26.

$$a^2 - b^2 \equiv (a + b)(a - b).$$

(2)

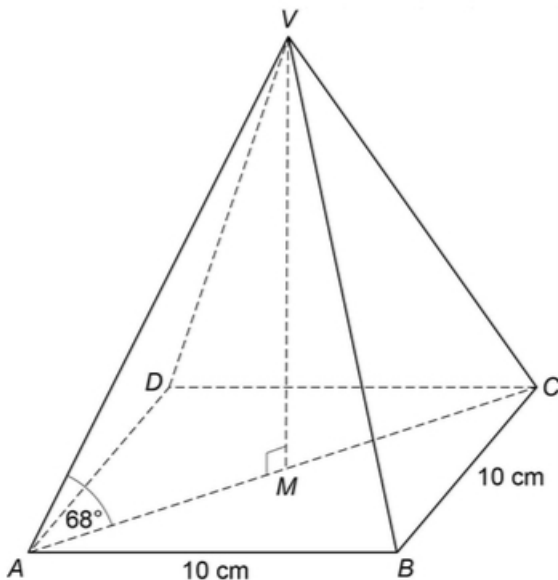
- a and b are positive whole numbers with $a > b$.
- $a^2 - b^2$ is a prime number.

Why are a and b consecutive numbers?

27. $VABCD$ is a square-based pyramid.

(6)

- The horizontal base $ABCD$ has side length 10 cm and centre M .
- Angle $VMA = 90^\circ$.
- Angle $VAM = 68^\circ$.



Volume of pyramid = $\frac{1}{3}$ × area of base × perpendicular height

Work out the volume of the pyramid.

28.

$$y = p \times q^{x-1},$$

(5)

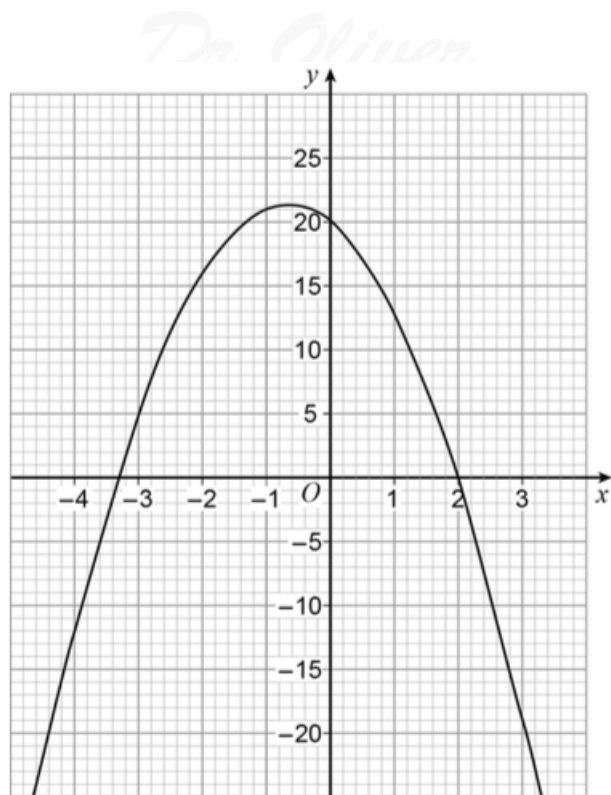
where p and q are numbers.

- $y = 10$ when $x = 1$.
- $y = 0.3125$ when $x = 6$.

Work out the value of y when $x = 3$.

29. Here is the graph of $y = f(x)$ where $f(x)$ is a quadratic function.

(2)



Write down all the integer solutions of $f(x) \geq 0$.

30.

(2)

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$$f(x) = \frac{1}{3}x + 4 \text{ for all values of } x.$$

$$g(x) = 6x^2 + 3 \text{ for all values of } x.$$

Work out $f \circ g(x)$.

Give your answer in the form

$$ax^2 + b,$$

where a and b are integers.

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