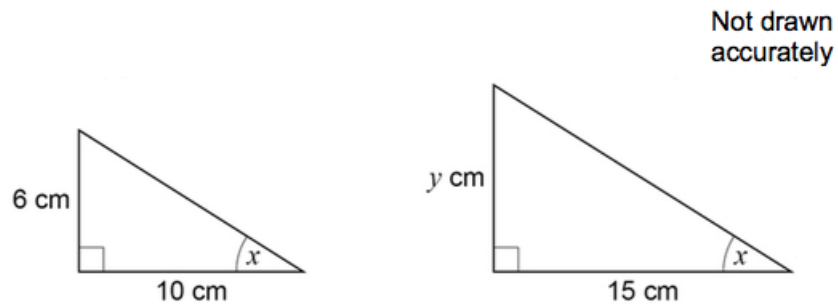


Dr Oliver Mathematics
AQA GCSE Mathematics
2019 June Paper 1: Non-Calculator
1 hour 30 minutes

The total number of marks available is 80.
You must write down all the stages in your working.

1. Here are two right-angled triangles. (1)



Circle the value of y .

11 7.5 9 4

2. Work out the value of (1)

$$\left(1\frac{2}{3}\right)^2.$$

Circle your answer.

$1\frac{4}{9}$ $3\frac{1}{3}$ $2\frac{4}{9}$ $2\frac{7}{9}$

3. Work out the arc length, in metres, of a semicircle of radius 6 metres. (1)

Circle your answer.

3π 6π 12π 18π

4. Circle the fraction that is equivalent to 4.625. (1)

$\frac{39}{8}$ $\frac{37}{8}$ $\frac{185}{4}$ $\frac{17}{4}$

5. (a) Write 0.00097 in standard form. (1)

(b) Work out

(2)

$$\frac{3 \times 10^5}{4 \times 10^3}$$

Give your answer as an ordinary number.

6. Anna plays a game with an ordinary, fair dice.

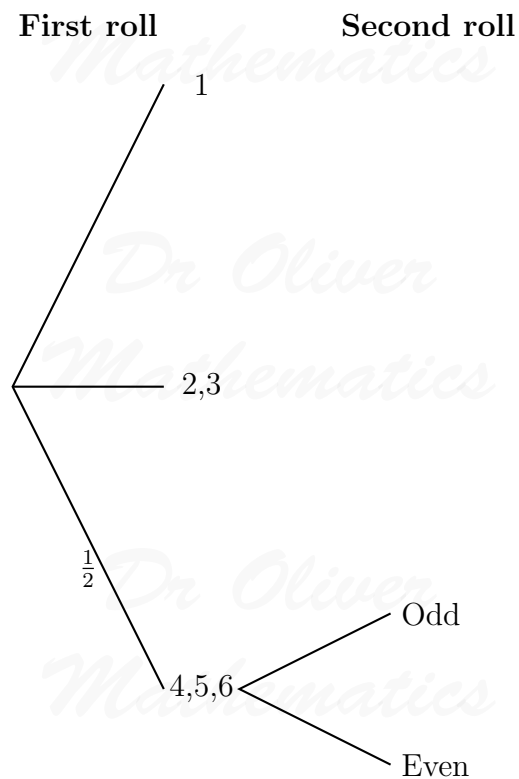
- If she rolls 1, she wins.
- If she rolls 2 or 3, she loses.
- If she rolls 4, 5 or 6, she rolls again.

When she has to roll again,

- if she rolls an odd number, she wins or
- if she rolls an even number she loses.

(a) Complete the tree diagram with the four missing probabilities.

(2)



(b) Is Anna more likely to win or to lose?

(4)

You **must** work out the probability that she wins.

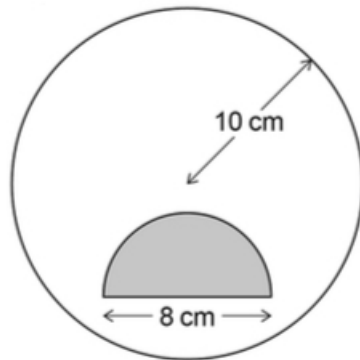
7. Three friends arrive at a party. (2)

Their arrival increases the number of people at the party by 20%.

In total, how many people are now at the party?

8. Work out the value of (3) $(3^{12} \div 3^5) \div (3^2 \times 3)$.

9. A shaded semi-circle is inside a circle as shown. (4)



Not drawn accurately

- The **radius** of the circle is 10 cm.
- The **diameter** of the semicircle is 8 cm.

How many times bigger is the unshaded area than the shaded area?

10. The number of items, n , made in 1 hour by a machine is given by

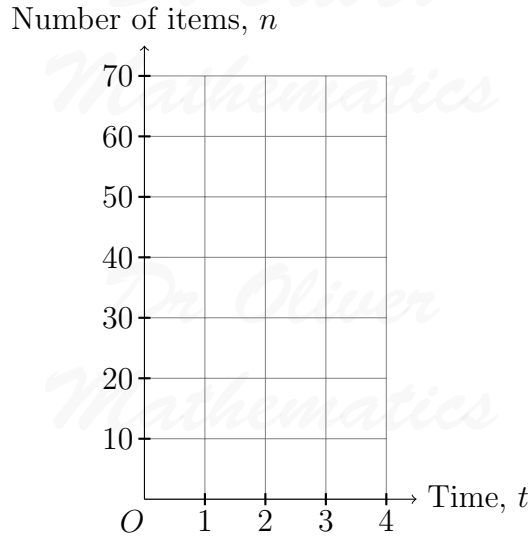
$$n = \frac{60}{t}.$$

- t is the time in minutes the machine takes to make one item.
- The value of t changes for different types of item.

(a) On the grid below, draw the graph of (2)

$$n = \frac{60}{t},$$

for values of t from 1 to 4.



The machine takes 3 minutes 30 seconds to make one item.

(b) Use your graph to estimate the value of n . (2)

11. Ed and Fay shared £330 in the ratio 7 : 4. (3)

- Ed gives Fay some of his money.
- Fay now has the same amount as Ed.

How much does Ed give Fay?

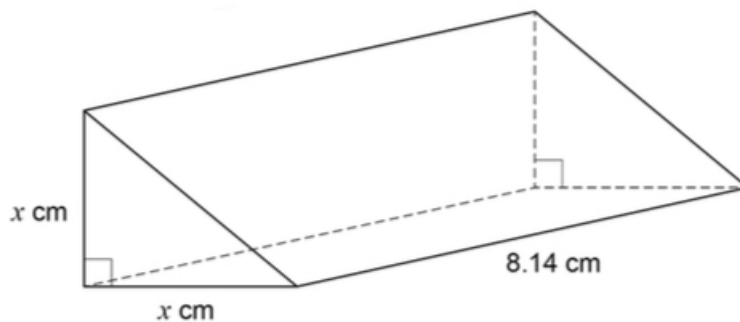
12. The next term of a sequence is made by adding the previous two terms. (1)

Which of these sequences follows this rule?

Circle your answer.

$-9, 2, -7, -5, -12$ $-3, 5, -2, 3, 1$ $0, -3, -3, 0, -3$ $-1, -1, -2, -3, 1$

13. The triangular cross section of a prism is an isosceles right-angled triangle. (3)



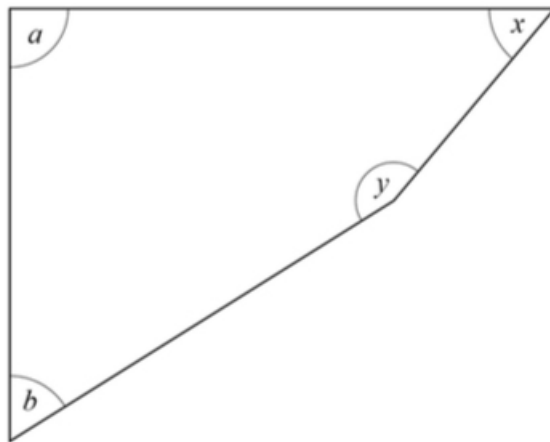
The volume of the prism is 102 cm^3 .

Use approximations to estimate the value of x .

You **must** show your working.

14. Here is a quadrilateral.

(3)



Not drawn accurately

- $a = 90^\circ$.
- $a : b = 5 : 3$.
- $x : y = 1 : 3$.

Show that

$$b = x.$$

15. Here is some information about the test marks of 120 students.

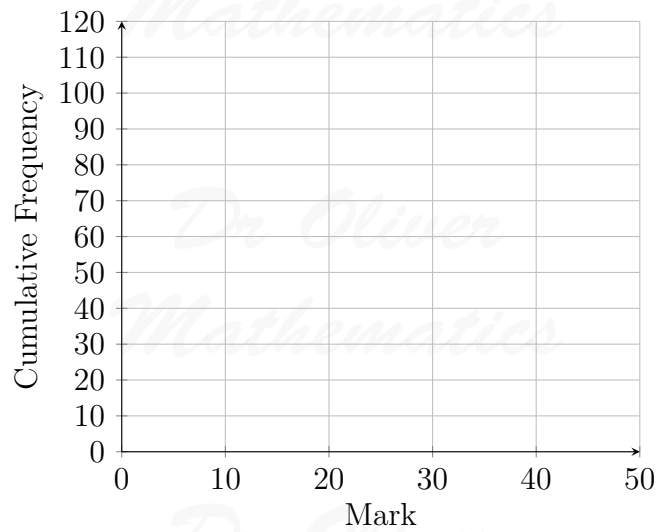
Mark, m	$0 < m \leq 10$	$10 < m \leq 20$	$20 < m \leq 30$	$30 < m \leq 40$	$40 < m \leq 50$
Frequency	20	28	40	20	12

(a) Complete the cumulative frequency table.

(1)

Mark, m	$m \leq 10$	$m \leq 20$	$m \leq 30$	$m \leq 40$	$m \leq 50$
Frequency	20	48			

- (b) Draw a cumulative frequency graph. (2)



Students who scored 15 marks or fewer take another test.

- (c) Use your graph to estimate how many students take another test. (2)
16. Simplify fully (3)

$$\frac{4x - 8x^2}{12x - 6}$$

17. Toby is forming and solving equations. (2)
- (a) Toby uses y to represent the number.

The product of half of a number and three more than the number
is the same as
the square of the number

Write an equation that Toby could form.

Toby forms another equation.

$$x = \frac{9}{8x}.$$

He wants to work out the values of x .

Here is his working.

$$\begin{aligned}x &= \frac{9}{8x} \\8x^2 &= 9 \\8x &= 3 \text{ or } 8x = -3 \\x &= \frac{3}{8} \text{ or } x = -\frac{3}{8}\end{aligned}$$

(b) What error has he made in his working? (1)

18. Here is an identity:

$$x^2 - y^2 \equiv (x + y)(x - y).$$

(a) Use the identity to work out the value of (2)

$$193^2 - 7^2.$$

You **must** show your working.

(b) Factorise (1)

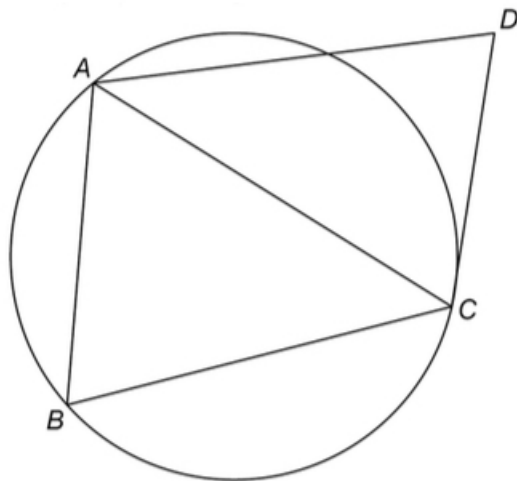
$$100a^2 - 81b^2.$$

19. Circle the fraction that is equivalent to 0.1. (1)

$$\frac{1}{9} \quad \frac{1}{99} \quad \frac{1}{10} \quad \frac{11}{100}$$

20. A , B , and C are points on a circle.
 CD is a tangent.

Not drawn accurately



Assume that triangle ABC is isosceles with $AC = BC$.

(a) Prove that AB is parallel to DC . (4)

In fact, triangle ABC is equilateral.

(b) Tick the **two** boxes for the statements that **must** be correct. (1)

AB is parallel to DC

AC bisects angle BCD

AC bisects angle BAD

21. Solve the simultaneous equations (4)

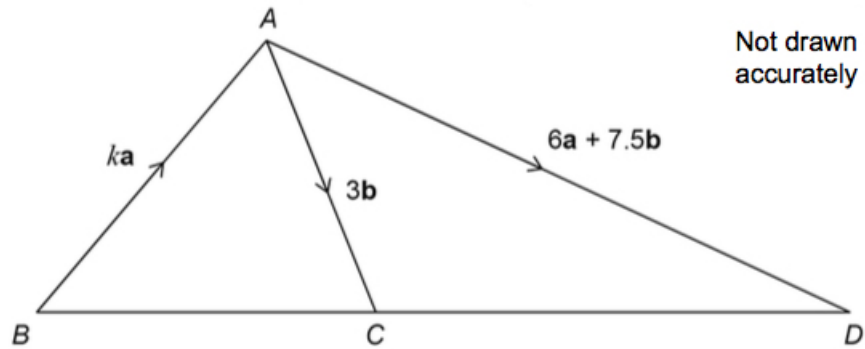
$$2x + 3y = 5p$$

$$y = 2x + p,$$

where p is a constant.

Give your answers in terms of p in their simplest form.

22. ABC and ACD are triangles.
 k is a constant.



- (a) Show that (1)

$$\vec{CD} = 6a + 4.5b.$$

BCD is a straight line.

- (b) Work out the value of k . (3)

You **must** show your working.

23. Simplify (3)

$$8^4 \div 32^{\frac{2}{5}}.$$

Give your answer in the form

$$2^m,$$

where m is an integer.

24. (1)

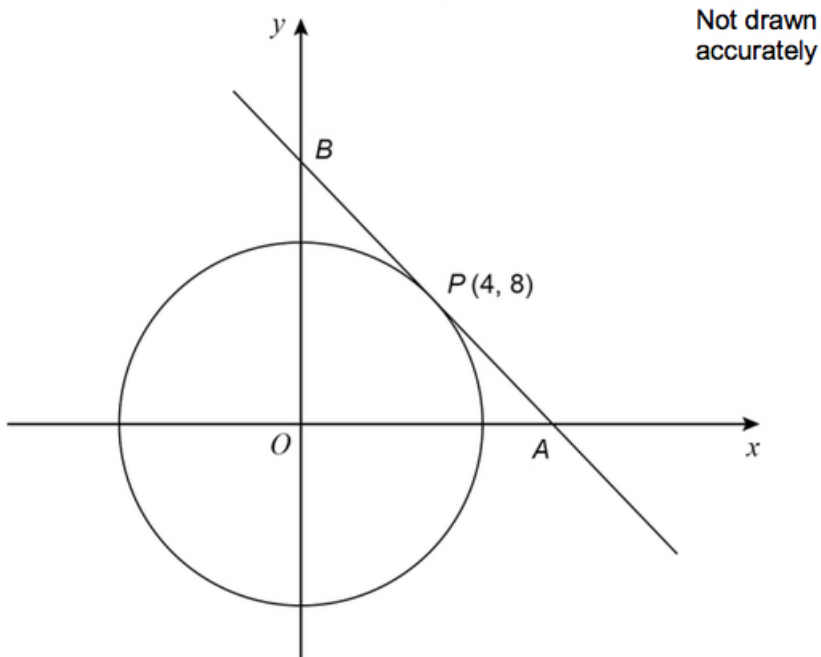
$$f(x) = \sin(x - 90)^\circ.$$

Circle the value of $f(0^\circ)$.

$$1 \quad 0 \quad -\frac{1}{2} \quad -1$$

25. $P(4, 8)$ is a point on a circle, centre O .

The tangent at P intersects the axes at points A and B .



(a) Show that the gradient of the tangent is $-\frac{1}{2}$. (2)

(b) Work out the length AB . (4)

Give your answer in the form $a\sqrt{5}$, where a is an integer.

You **must** show your working.

26. The turning point of the graph (3)

$$y = (x + a)^2 + b$$

has x -coordinate -2 .

$(3, 1)$ is another point on the graph.

Work out the y -coordinate of the turning point.

27. Angle x is acute. (3)

$$\cos x = \sin 60^\circ \times \tan 30^\circ.$$

Work out the size of angle x .

You **must** show your working.