

Dr Oliver Mathematics
AQA GCSE Mathematics
2020 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.

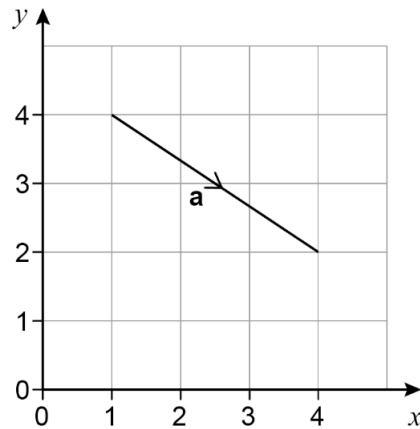
1. Circle the fraction that is equivalent to 4.75.

(1)

$$\frac{15}{4} \quad \frac{19}{4} \quad \frac{21}{4} \quad \frac{23}{4}$$

2. Here is vector **a**.

(1)



Circle the column vector that represents **a**.

$$\begin{pmatrix} 3 \\ 2 \end{pmatrix} \quad \begin{pmatrix} -3 \\ 2 \end{pmatrix} \quad \begin{pmatrix} 3 \\ -2 \end{pmatrix} \quad \begin{pmatrix} -3 \\ -2 \end{pmatrix}$$

3. Which one of these is a square number **and** a cube number?
Circle your answer.

(1)

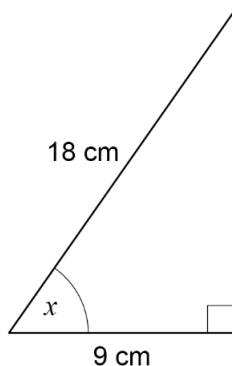
100 1 000 10 000 1 000 000

4. Circle the reciprocal of $\frac{5}{6}$.

(1)

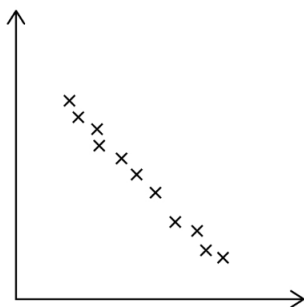
$$\frac{6}{5} \quad \frac{1}{6} \quad -\frac{1}{6} \quad -\frac{6}{5}$$

5. Use trigonometry to work out the size of angle x . (2)

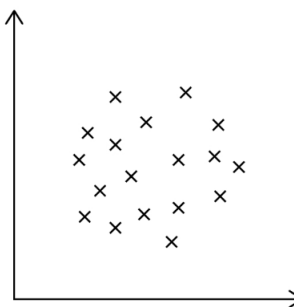


6. A and B are scatter graphs. (2)

Graph A



Graph B



What type of correlation is shown by each graph?
Choose from

Weak positive
Strong positive
Weak negative
Strong negative
No correlation

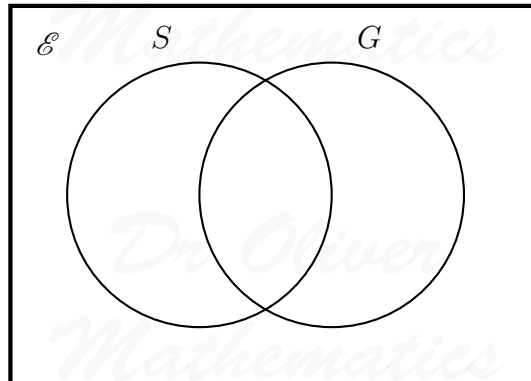
7. Here is some information about 80 people who play in bands. (4)

- 12 are singers but not guitar players.

- 30% are neither a singer nor a guitar player.
- 41 of the guitar players are also singers.

Complete this Venn diagram to represent the information.

- $\mathcal{E}$ = 80 people who play in bands.
- S = singers.
- G = guitar players.



8. The shorter side of a parallelogram has length 6.5 cm.

(3)



Not drawn
accurately

The length of the shorter side is $\frac{1}{9}$ of the perimeter.

Work out the length of the longer side.

9. (a) All the terms of a **geometric** progression are positive.
The second and fourth terms are shown.

(2)

... 4 ... 16

Work out the first and third terms.

- (b) The first two terms of an arithmetic progression are shown. (3)

$$p \quad 5p \quad \dots$$

The sum of the first three terms is 90.

Work out the value of p .

10. The cost of a holiday is £2 400. (4)
Rana pays a deposit followed by monthly payments, in the ratio

$\text{deposit} : \text{total of the monthly payments} = 3 : 5$

She makes 6 equal monthly payments.

Work out her monthly payment.

11. As a decimal, (2)

$$\frac{11}{40} = 0.275.$$

Work out

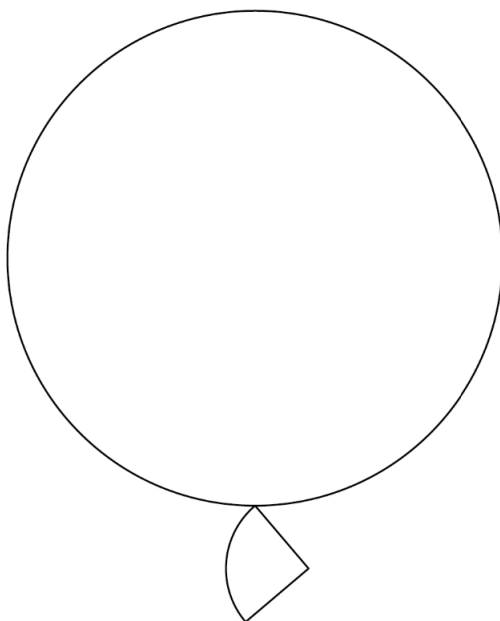
$$\frac{33}{400}$$

as a decimal.

12. Two wire shapes make an earring.
The shapes are

- a circle with radius 21 mm and
- a quarter circle.

Not drawn
accurately



radius of circle : radius of quarter circle = 7 : 2

12

(a) Show that the radius of the quarter circle is 6 mm. (1)

(b) Work out the **total** length of the wire in the earring. (4)
Give your answer in the form

$$a\pi + b,$$

where a and b are integers.

13. (a) s and t are **positive** integers. (2)

- $(x + s)(x - t)$ is expanded and simplified.

- The answer is

$$x^2 + kx - 40,$$

where k is a positive integer.

Work out the smallest possible value of k .

(b) Faisal tries to solve (1)

$$(x + 2)(x - 7) = 0.$$

Here is his working.

	$(x + 2) = 0$	or	$(x - 7) = 0$
Answer	$x = 2$	or	$x = 7$

Give a reason why his answer is wrong.

14. (a) (2)

$$c = 2^{10} \times 3 \times 5^6.$$

Work out $18c$.

Give your answer as a product of prime factors in index form.

- (b) Work out (2)

$$\sqrt[3]{\frac{2^7 \times 11^3}{2}}.$$

Give your answer as an integer.

15. (1)

$$3x = \frac{1}{2}y.$$

Circle the ratio $x : y$

$$6 : 1 \quad 1 : 6 \quad 3 : 2 \quad 2 : 3$$

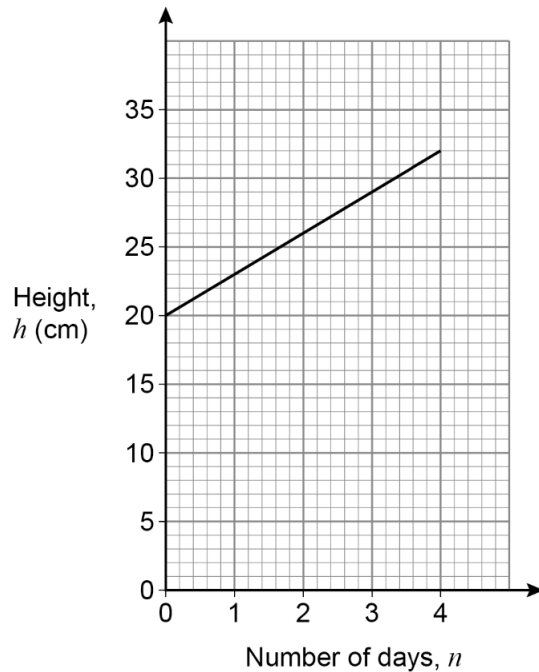
16. A sequence of numbers is formed by the iterative process (2)

$$u_{n+1} = \frac{4}{u_n - 1} \text{ and } u_1 = 9.$$

Work out the values of u_2 and u_3 .

17. Jim buys a plant of height 20 cm. (3)

The graph shows how the height of the plant changes during the next 4 days.



Work out a formula for h in terms of n .

18. Solve the simultaneous equations (4)

$$\begin{aligned} 2x + 4y &= -9 \\ 2y &= 4x - 7. \end{aligned}$$

19. Circle the expression that is equivalent to (1)

$$\frac{1}{5}x + \frac{1}{10}x.$$

$$\frac{3}{10}x \quad \frac{2}{15}x \quad \frac{1}{25}x \quad \frac{1}{50}x^2$$

20. (a) Write down the value of 7^0 . (1)

- (b) Work out the value of $32^{-\frac{3}{5}}$. (2)

21. Write these numbers in order of size. (2)

$$15.6 \quad 3\sqrt{23} \quad 2.1^4 \quad \frac{47}{3}$$

Start with the smallest.

22. (a) y is directly proportional to x^3 . (3)

$y = 17$ when $x = 4$.

Work out an equation connecting y and x .

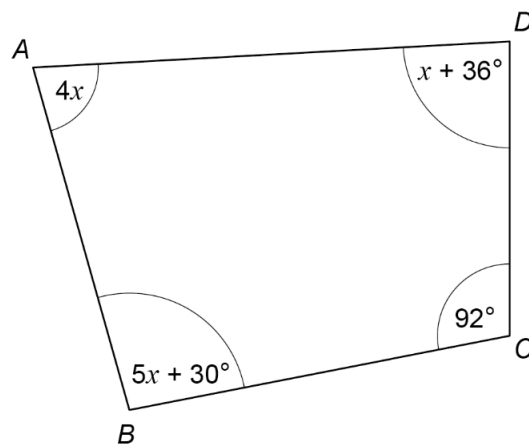
- (b) m is inversely proportional to $\sqrt{r}$. (1)

The value of r is multiplied by 4.

Circle what happens to the value of m .

$\times 2$ $\times 16$ $\div 2$ $\div 16$

23. $ABCD$ is a quadrilateral. (4)



Not drawn
accurately

Prove that $ABCD$ is **not** a cyclic quadrilateral.

24. y is an obtuse angle. (1)

Which statement is true?

Tick **one** box.

☐

$\sin y > 0$ and $\cos y > 0$

☐

$\sin y > 0$ and $\cos y < 0$

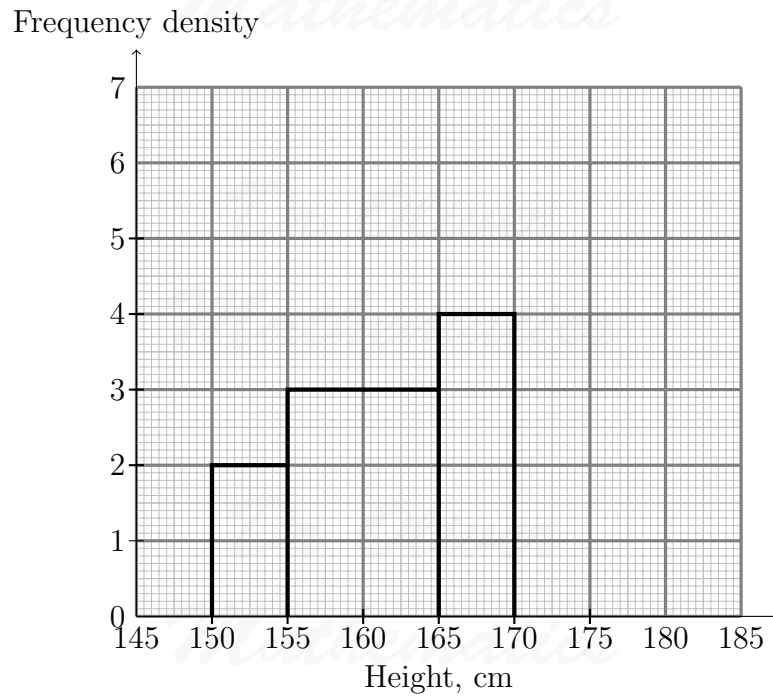
☐

$\sin y < 0$ and $\cos y > 0$

☐

$\sin y < 0$ and $\cos y < 0$

25. A histogram is drawn to represent the heights of a sample of women. (4)
Three of the four bars are shown.
The bar for $170 \text{ cm} \leq \text{height} < 180 \text{ cm}$ is missing.



There are 74 women in the sample.

Complete the histogram.

26. (a) Show that (2)

$$\frac{14}{\sqrt{7}}$$

can be written in the form

$$a\sqrt{b},$$

where a and b are integers.

- (b) Work out (3)

$$2\sqrt{10} \times \sqrt{80} \times \sqrt{18}.$$

Give your answer as an integer.

27. A and B are similar solid cylinders. (2)

$$\text{Base area of } A : \text{base area of } B = 9 : 25.$$

Complete these ratios.

$$\text{Curved surface area of } A : \text{curved surface area of } B = \dots : \dots$$

$$\text{Height of } A : \text{height of } B = \dots : \dots$$

28. Factorise fully (2)

$$144 - 4x^2.$$

29. The graph of (4)

$$y = x^3 + 6$$

is translated 4 units to the right.

The translated graph has equation $y = f(x)$.

Work out $f(x)$.

Give your answer in the form

$$x^3 + ax^2 + bx + c,$$

where a , b , and c are integers.