

**Dr Oliver Mathematics**  
**AQA GCSE Mathematics**  
**2019 November 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 calculation that decreases 250 by 15%: (1)

$$250 \div 1.15 \quad 250 \times 0.15 \quad 250 \times 0.85 \quad 250 \div 0.85$$

2. Solve (1)

$$3x = 2x.$$

Circle your answer.

$$x = -1 \quad x = 0 \quad x = \frac{2}{3} \quad x = \frac{3}{2}$$

3.  $A(2, 13)$  and  $B(10, 1)$ . (1)

Circle the midpoint of  $AB$ .

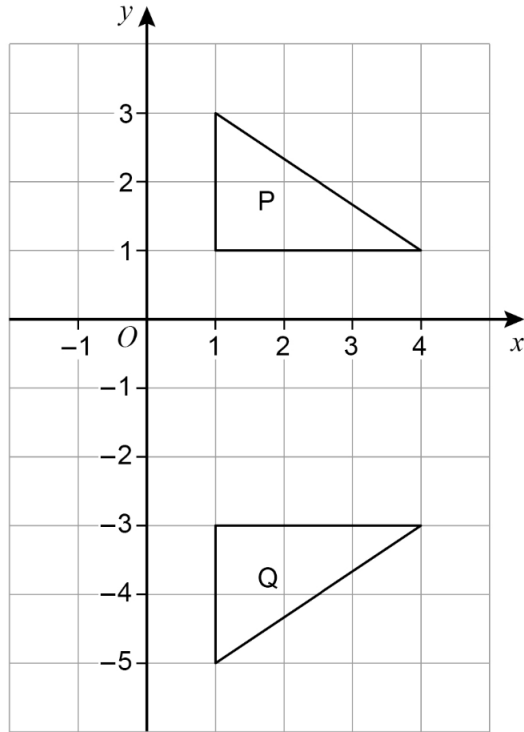
$$(4, 6) \quad (5, 6.5) \quad (6, 7) \quad (8, 12)$$

4. Circle the expression equivalent to (1)

$$(2x)^4.$$

$$2x^4 \quad 6x^4 \quad 8x^4 \quad 16x^4$$

5. (a) Here are two triangles,  $P$  and  $Q$ . (1)



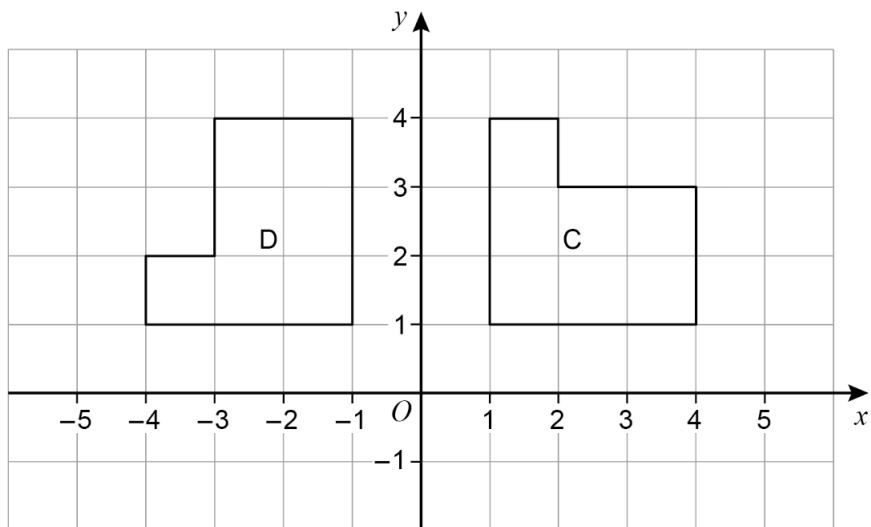
Here is a statement.

A transformation that maps  $P$  to  $Q$  is a reflection in the line  $x = -1$ .

Make **one** criticism of the statement.

(b) Here are two triangles,  $C$  and  $D$ .

(1)



Here is a statement.

A transformation that maps  $C$  to  $D$  is a rotation through  $90^\circ$  anticlockwise.  
Make **one** criticism of the statement.

6. (a) A geometric progression starts (1)

$$4 \quad 16$$

Work out the next term.

- (b) A Fibonacci-type sequence starts (2)

$$3 \quad -8$$

The sequence is continued by adding the previous two terms.

Work out the next two terms.

7. Given that (2)

$$a \times 60 = b,$$

work out the value of

$$\frac{4b}{a}.$$

8. Write (3)

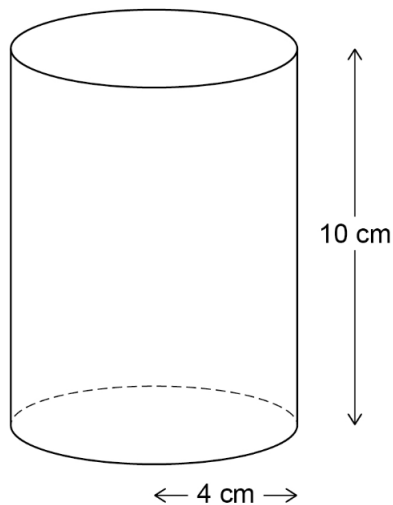
$$27 \times (3^2)^7$$

as a single power of 3.

9. Here are two solids. (4)

**Cylinder**

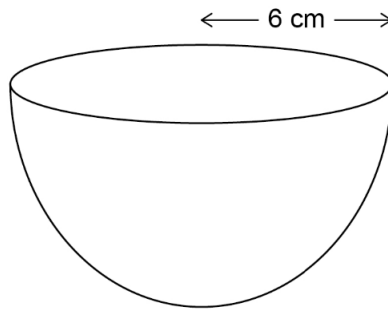
radius 4 cm      height 10 cm



*Dr. Oliver*

**Hemisphere**

radius 6 cm



volume of a hemisphere =  $\frac{2}{3} \pi r^3$  where  $r$  is the radius

Which solid has the greater volume?

You **must** show your working.

10. Saj makes Rose Pink paint and Cherry Pink paint.  
He mixes red paint with white paint as shown.

(4)

**Rose Pink**  
red : white = 1 : 2

**Cherry Pink**  
red : white = 4 : 3

He makes 60 litres of Rose Pink paint.

To this Rose Pink paint he adds 80 litres of red paint and 28 litres of white paint.

Has he now made Cherry Pink paint?

You **must** show your working.

11. (a) Work out

$$\frac{2 \times 10^{14}}{8 \times 10^9}$$

(2)

Give your answer in standard form.

- (b)

$$6\,200.07 = 6.2 \times 10^c + 7 \times 10^d.$$

(2)

Work out the values of  $c$  and  $d$ .

12.

(1)

$$V = \frac{k}{H}, \text{ where } k \text{ is a constant.}$$

Which **two** statements are correct?

Tick **two** boxes.

$V$  is directly proportional to  $H$

$V$  is inversely proportional to  $H$

$V$  is directly proportional to  $\frac{1}{H}$

$V$  is inversely proportional to  $\frac{1}{H}$

13. The  $n$ th term of a sequence is

(3)

$$\frac{n(n-4)}{\sqrt{n+3}}$$

Work out the sum of the 1st and 6th terms.

14.

(1)

$$8\,300 = 100 \times 83.$$

Circle the number that is closest in value to

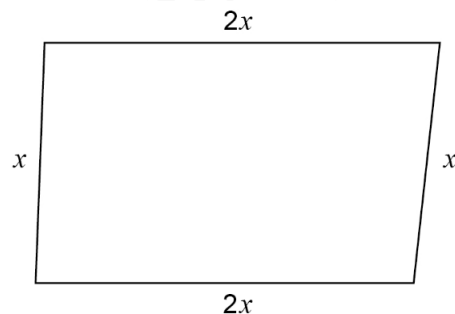
$$\sqrt{8\,300}$$

19   90   830   900

15. Here is a **sketch** of a quadrilateral.

(3)

All lengths are in centimetres.



Not drawn  
accurately

Tick **one** box for each statement.

	True	May be true	Not true
The quadrilateral is a rectangle			
The quadrilateral is a parallelogram			
The quadrilateral is a rhombus			
The quadrilateral is a kite			

16. In a box there are some buttons.

(4)

45 are large and the rest are small.

Some are yellow and the rest are green.

- The number of small is  $\frac{5}{3}$  of the number of large.
- The number of green is 300% of the number of yellow.
- There are 12 small yellow buttons.

How many large green buttons are there?

You may use the two-way table to help you.

	Large	Small	Total
Yellow		12	
Green			
Total	45		

17.

(1)

$$\mathbf{a} = \begin{pmatrix} -3 \\ 2 \end{pmatrix} \text{ and } \mathbf{b} = \begin{pmatrix} 1 \\ -5 \end{pmatrix}.$$

Work out

$$\mathbf{a} - 3\mathbf{b}.$$

Circle your answer.

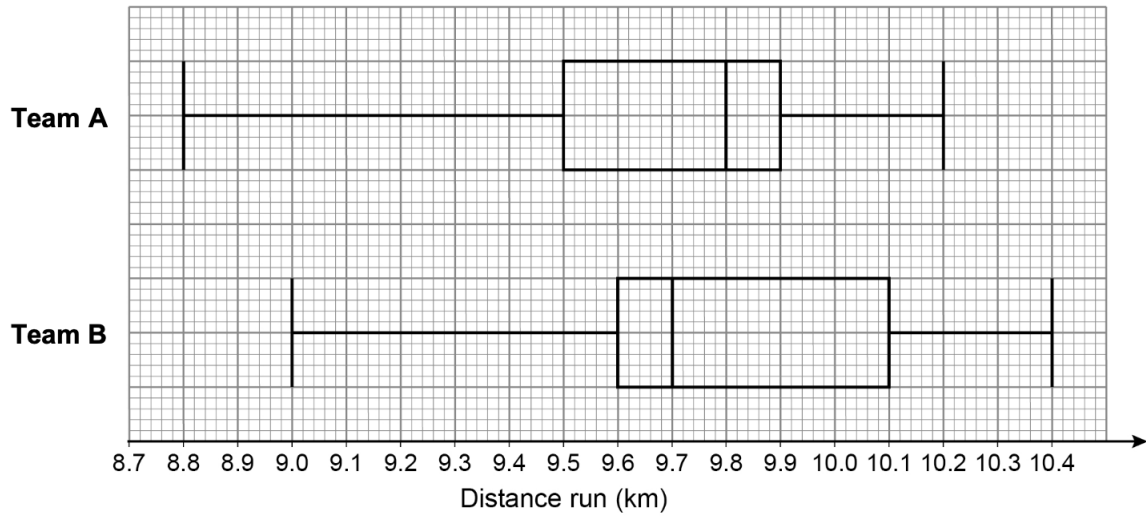
$$\begin{pmatrix} -6 \\ 17 \end{pmatrix} \quad \begin{pmatrix} -6 \\ -13 \end{pmatrix} \quad \begin{pmatrix} 0 \\ 17 \end{pmatrix} \quad \begin{pmatrix} 0 \\ -13 \end{pmatrix}$$

18. Solve

(4)

$$\frac{x + 15}{3} = 2(x + 10).$$

19. The box plots represent the distances run by the players in a football match.



- (a) On average, which team's players ran further?  
Tick a box. (1)

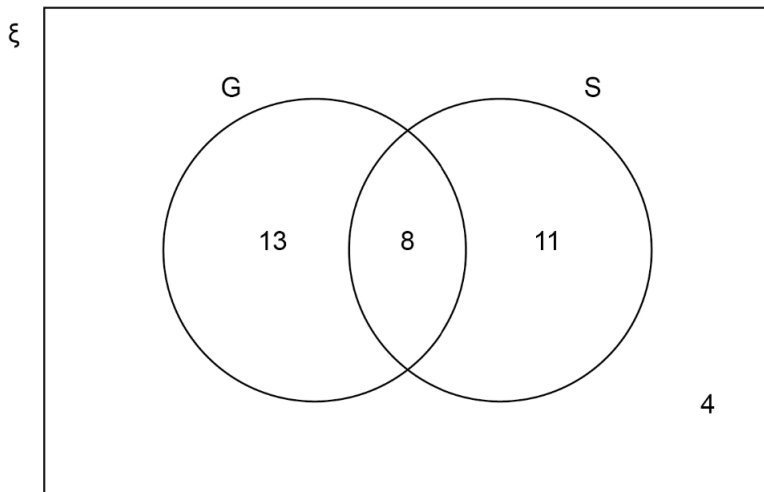
Team A       Team B

Give a reason for your answer.

- (b) The players in Team A ran more consistent distances.  
How do the box plots show this? (1)

20. The Venn diagram shows information about some houses.

- $G$  = houses with a garage.
- $S$  = houses with a shed.



A house is chosen at random.

- (a) The house has a garage. (1)

What is the probability that it has a shed?

- (b) The house does **not** have a garage. (1)

What is the probability that it does **not** have a shed?

- (c) Show that (2)

$$P[(G \cap S)'] > P(G \cup S')$$

21. Work out (1)

$$0.70\dot{4}\dot{8} - 0.001$$

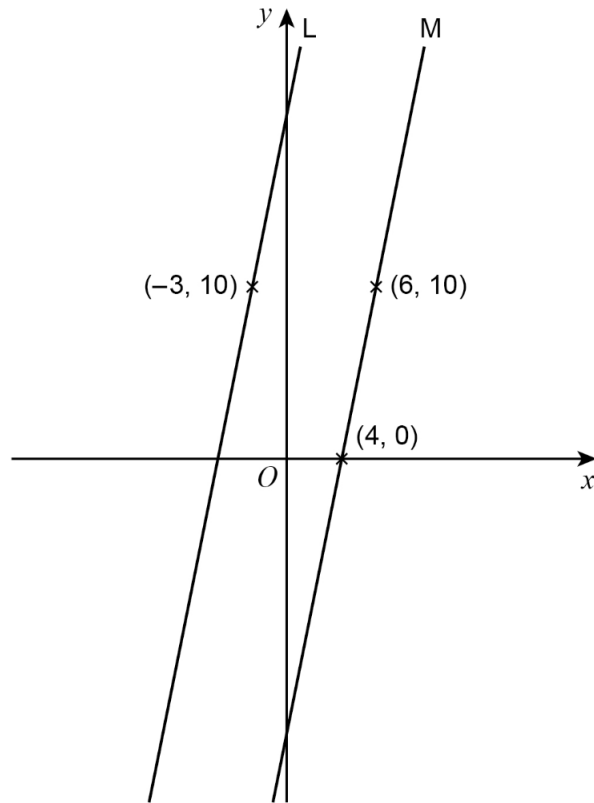
Circle your answer.

$$0.70\dot{3}\dot{8} \quad 0.703\dot{8} \quad 0.703\dot{8}\dot{3} \quad 0.703\dot{8}\dot{4}$$

22. •  $(-3, 10)$  is a point on line  $L$ . (3)

- $(4, 0)$  and  $(6, 10)$  are points on line  $M$ .

- $L$  and  $M$  are parallel.



Not drawn accurately

Work out the equation of line  $L$ .  
Give your answer in the form  $y = mx + c$ .

23. (a) Factorise

$$5x^2 + 6x - 8.$$

(2)

- (b) Simplify fully

$$\frac{x^2 + 9x + 14}{x^2 - 4}.$$

(3)

24. Work out

$$\sqrt{18} - \frac{28}{\sqrt{50}}.$$

(4)

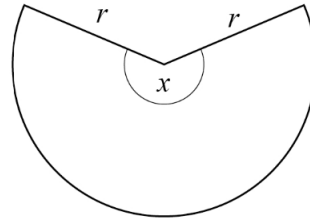
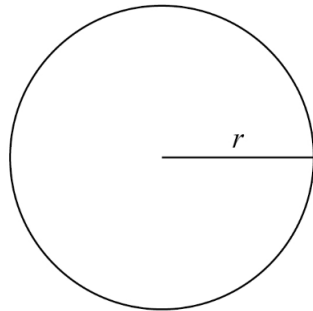
Give your answer in the form

$$\frac{\sqrt{a}}{b},$$

where  $a$  and  $b$  are integers.

25. A bag contains 8 balls.  
3 are red and 5 are blue.  
2 balls are taken from the bag at random without replacement.

- (a) Write down the probability that there is **at least** 1 red ball still in the bag. (1)
- (b) Work out the probability that there are **at least** 2 red balls still in the bag. (3)
26. Here are a circle and a sector of the circle. (4)
- They each have radius  $r$ .



Not drawn accurately

circumference of circle = perimeter of sector

Work out the size of angle  $x$ .  
Give your answer in terms of  $\pi$ .

27. A curve has the equation

$$y = x^2 - 6x + 17.$$

The turning point of the curve is at  $(a, 8)$ .

- (a) By completing the square, or otherwise, work out the value of  $a$ . (2)

The turning point of the curve

$$y = x^2 + 4x + b$$

also has  $y$ -coordinate 8.

- (b) Work out the value of  $b$ . (2)

28. Work out the value of

$$100^{-\frac{1}{2}}.$$

29. Show that the value of

$$5 \sin 30^\circ \times \cos 30^\circ \times 8 \tan 30^\circ$$

is an integer. (4)