Dr Oliver Mathematics
AQA GCSE Mathematics
2017 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.
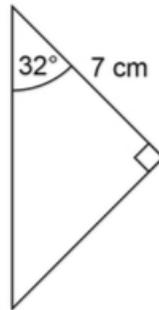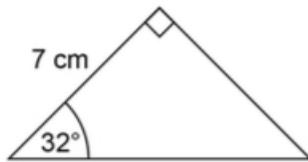
1. Simplify (1)
$$2^5 \times 2^3.$$

   Circle your answer.

   $\qquad 4^8 \quad 2^8 \quad 2^{15} \quad 4^{15}$

2. Circle the reason why these triangles are congruent. (1)

Not drawn accurately

SSS   SAS   ASA   RHS

3. Which of these is a geometric progression? (1)
   Circle your answer.

   $2, 4, 6, 8, 10 \qquad\qquad 2, 6, 18, 54, 162$

   $2, 3, 5, 8, 12 \qquad\qquad 2, 6, 10, 14, 18$

4. (1)
$$a : b = 4 : 3.$$

   Circle the correct statement.

   b is $\frac{4}{7}$ of a $\quad$ b is $\frac{3}{7}$ of a $\quad$ b is $\frac{4}{3}$ of a $\quad$ b is $\frac{3}{4}$ of a

5. Write 36 as a product of prime factors. (3)
Give your answer in index form.

6. The table shows information about the times for 10 people to complete a task. (4)

Time, t minutes	Frequency
$0 < t \leqslant 20$	1
$20 < t \leqslant 40$	6
$40 < t \leqslant 60$	3

These statements are about the mean and range of the actual times.
Tick the correct box for each statement.

	True	False
The mean could be less than 20 minutes		
The mean could be more than 40 minutes		
The mean could be less than 40 minutes		
The range could be more than 40 minutes		
The range could be less than 40 minutes		
The range could be more than 60 minutes		

7. (2)
$$\tfrac{3}{5} \text{ of a number is } 162.$$

Work out the number.

8. (2)
$$x \text{ km/h} = y \text{ mph.}$$

Use
$$8 \text{ km/h} = 5 \text{ mph}$$

to write a formula for y in terms of x.

9.
$$\text{Density} = \frac{\text{mass}}{\text{volume}}.$$

(a) The mass of solid A is 6 times the mass of solid B. (1)
The volume of solid A is 3 A times the volume of solid B.

Complete the sentence:

The density of solid A is .... times the density of solid B.

2

$$\text{Average speed} = \frac{\text{distance}}{\text{time}}.$$

(b) If the distance is halved and the time is doubled, what happens to the average speed?   (1)

Circle your answer.

$$\times 2 \qquad \times 4 \qquad \text{no change} \qquad \div 2 \qquad \div 4$$

10. Solve the simultaneous equations.   (3)

$$2x + y = 18$$
$$x - y = 6.$$

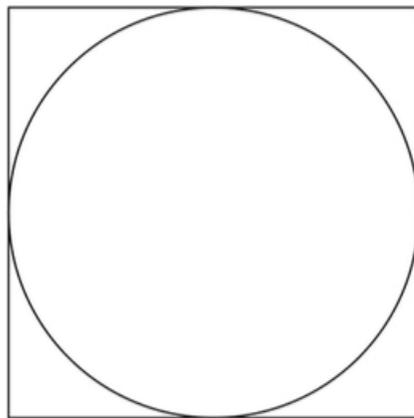11. Billy wants to buy these tickets for a show.   (5)

   • 4 adult tickets at £15 each and
   • 2 child tickets at £10 each

A 10% booking fee is added to the ticket price.
3% is then added for paying by credit card.

Work out the **total** charge for these tickets when paying by credit card.

12. Here is a circle touching a square.   (3)

Not drawn
accurately

The area of the square is 64 cm².

Work out the area of the circle.
Give your answer in terms of π.

3

13. Write the number   (2)

    six million five thousand two hundred

    in standard form.

14. Solve   (1)
$$-3x > 6.$$

15.   (1)

    $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$, and $\frac{1}{9}$ are four fractions.

    How many of these fractions convert to a recurring decimal?
    Circle your answer.

    $$0 \quad 1 \quad 2 \quad 3 \quad 4$$

16. A fair spinner has five equal sections numbered 1, 2, 3, 4, and 5.
    A fair six-sided dice has five red faces and one green face.

    - The spinner is spun.

    - If the spinner shows an even number, the dice is thrown.

    (a) Complete the tree diagram for the spinner and the dice.   (2)

    Spinner   **Dice**

    Even

    Odd
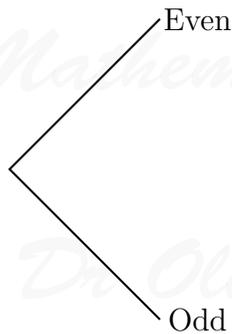
    (b) Work out the probability of getting an even number and the colour green.   (2)

17. A is the point $(2, -5)$.
    B is the point $(4, -9)$.

    (a) Show that the gradient of the straight line passing through A and B is -2. (2)

(b) C is the point $(-301, 601)$. (2)

Does C lie on the straight line passing through A and B?
You **must** show your working.

18. Bottles of drink are for sale at three shops. (3)
The normal price of a bottle is the same at each shop.

Shop A
Buy 1 bottle
Get 2 more bottles at half price

Shop B
Buy 2 bottles
Get 3 more bottles at half price

Shop C
30% off a bottle

What is the cheapest way to buy **exactly** 8 bottles?
You can buy from more than one shop.
You **must** show your working.

19. Here is some information about the marks of 60 students in a test.

Mark, m	Frequency
$40 < m \leqslant 50$	9
$50 < m \leqslant 60$	16
$60 < m \leqslant 70$	20
$70 < m \leqslant 80$	8
$80 < m \leqslant 90$	7

(a) Draw a cumulative frequency graph. (3)

(b) Use your graph to estimate the lowest mark of the top 20% of students. (2)
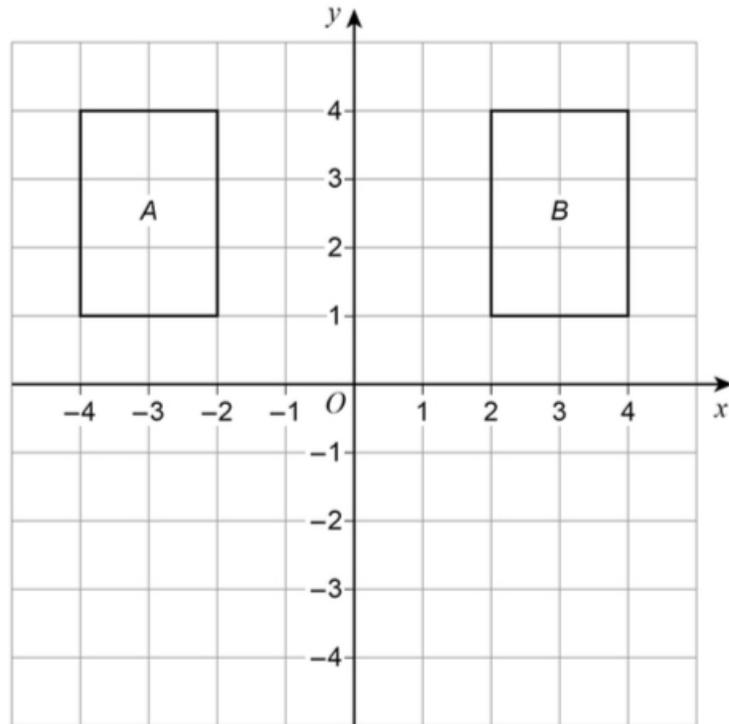
20. Work out the diameter of the circle (1)

$$x^2 + y^2 = 64.$$

Circle your answer.

$$8 \quad 16 \quad 32 \quad 128$$

5

21. (a) The diagram shows rectangles A and B. (1)

Rectangle A can be mapped to rectangle B by a single transformation.

Javed says, "The only single transformation is a reflection in the y-axis because the rectangles are on opposite sides of the y-axis."
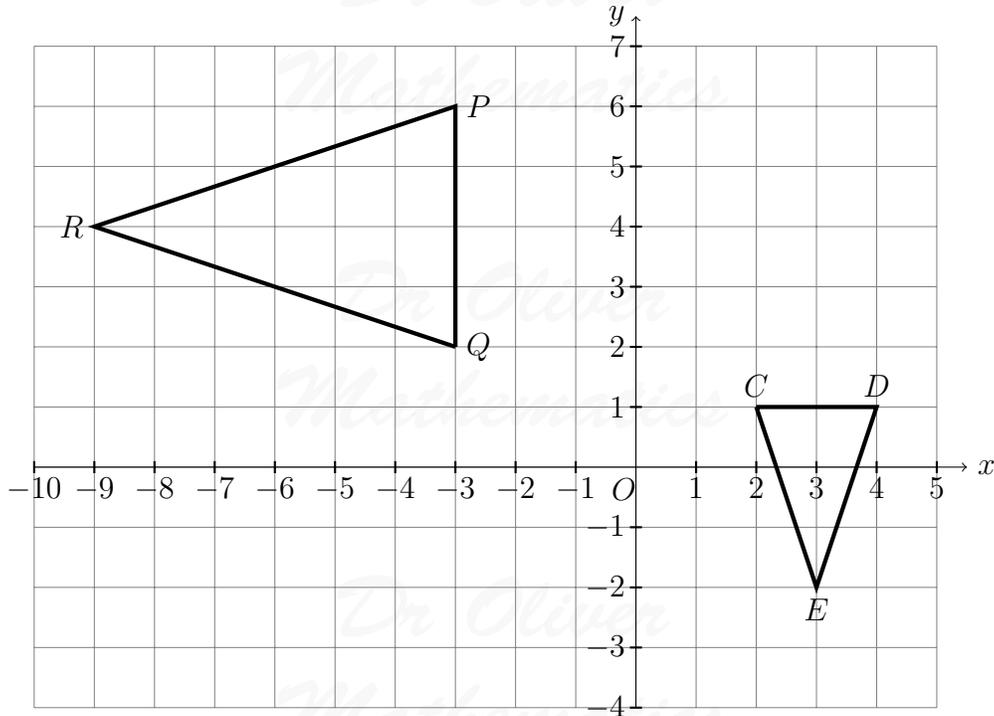
Is he correct?
Tick a box.

Yes ☐   No ☐

Give a reason for your answer.
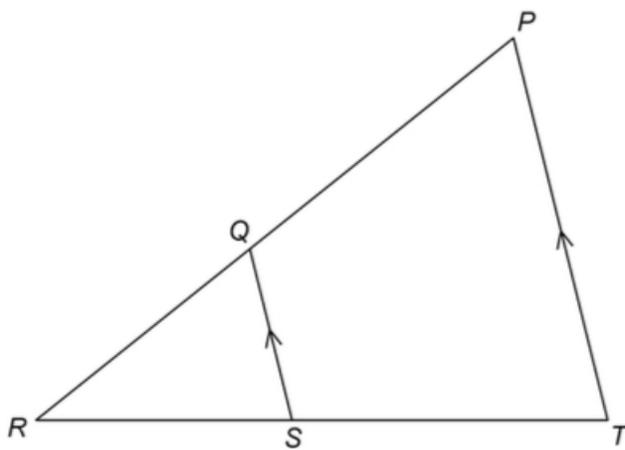
(b) This diagram shows triangles CDE and PQR. (3)

CDE is mapped to PQR by combining two single transformations.
The first is a rotation of $90°$ anticlockwise about E.

Describe fully the second transformation.

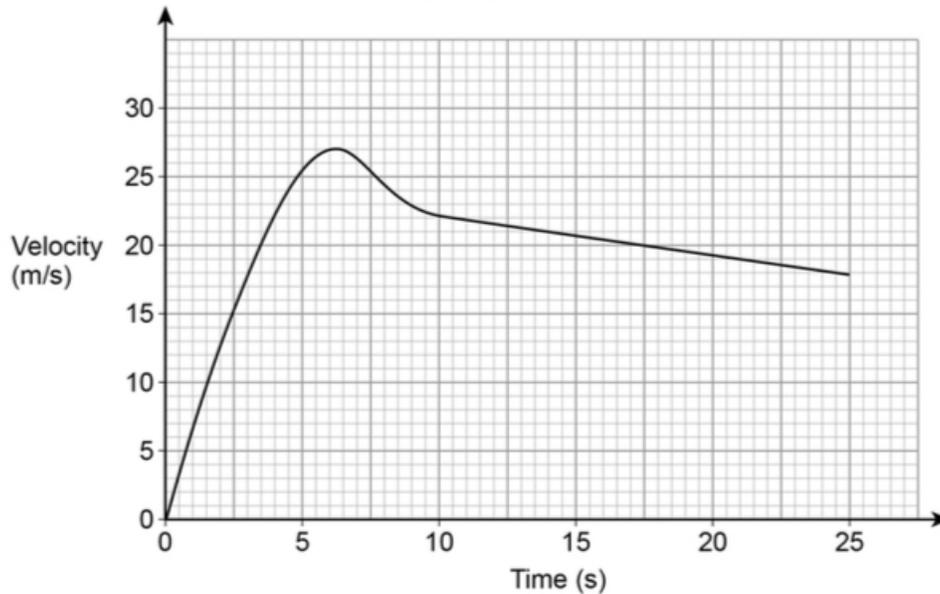22. PRT and QRS are similar triangles. (1)

Not drawn
accurately

7

Which of these is equivalent to $\dfrac{QR}{PR}$?

$$\frac{RS}{ST} \qquad \frac{QS}{PT} \qquad \frac{PT}{QS} \qquad \frac{RT}{RS}$$

23. Here is a velocity-time graph of a motorbike for 25 seconds.

(a) After how many seconds was the acceleration zero? (1)

(b) Work out the distance travelled in the last 15 seconds. (2)

24. (a) Work out (1)
$$\sqrt{12\tfrac{1}{4}}$$
as an improper fraction.

(b) Work out (2)
$$\sqrt[3]{16}$$
as a power of 2.

25. In an office (4)

- there are twice as many females as males,
- $\frac{1}{4}$ of the females wear glasses,
- $\frac{3}{8}$ of the males wear glasses, and
- 84 people in the office wear glasses.

8
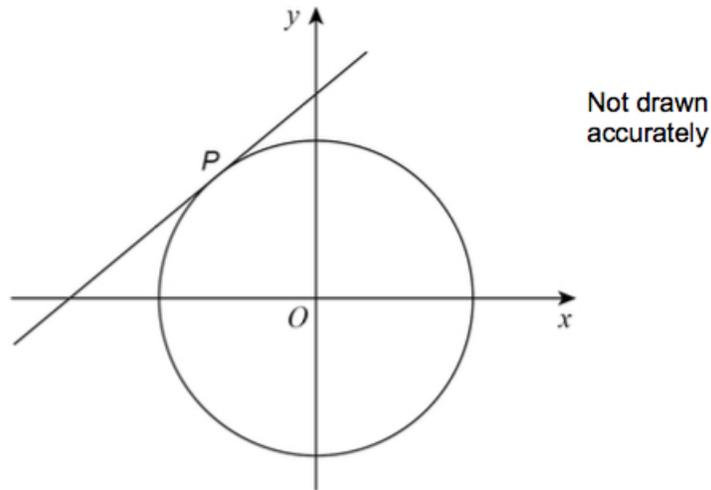
Work out the number of people in the office.

26. Expand and simplify (4)
$$(x-4)(2x+3y)^2.$$

27. $P(-1,4)$ is a point on a circle, centre O. (4)

Not drawn accurately

Work out the equation of the tangent to the circle at P.
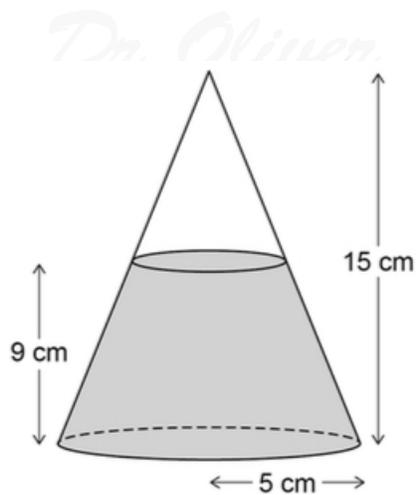Give your answer in the form $y = mx + c$.

28. (4)

Volume of cone $= \frac{1}{3}\pi r^2 h$ where r is the radius and h is the perpendicular height.

A cone has a

- horizontal base of radius 5 cm and
- height of 15 cm.

The cone contains water to a depth of 9 cm.

9

Work out the volume of the water, in cm³.
Give your answer in terms of π.

29. Simplify

    (4)

$$\frac{2\sin 45° - \tan 45°}{4\tan 60°}.$$

Give your answer in the form

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

where a, b, and c are integers.