# Dr Oliver Mathematics
# AQA GCSE Mathematics
# 2018 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. Simplify (1)

$$(5^4)^2.$$

Circle your answer.

$$5^6 \quad 5^8 \quad 25^6 \quad 25^8$$

2. Circle the volume, in $\text{cm}^3$, of a cylinder with radius 5 cm and height 8 cm. (1)

$$40\pi \quad 80\pi \quad 200\pi \quad 1\,600\pi$$

3. Simplify (1)

$$16a^2 \div a + 3a \times 2.$$

Circle your answer.

$$22a \quad 8a \quad 38a \quad 2a$$

4. Circle the value of $\cos 30^\circ$. (1)

$$\frac{1}{2} \quad \frac{\sqrt{3}}{2} \quad 0 \quad 1$$

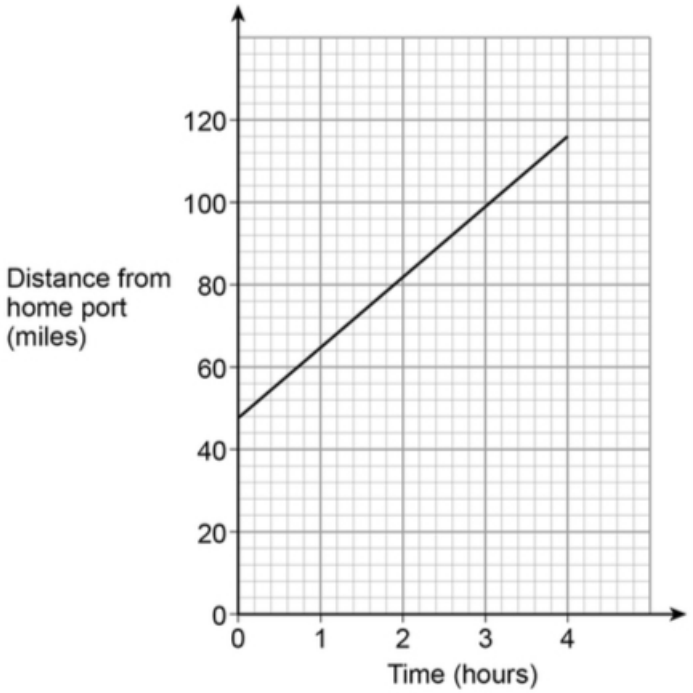
5. Work out (4)

$$8\tfrac{1}{2} \div 2\tfrac{2}{3}.$$

Give your answer as a mixed number.

6. A ship is sailing in a straight line from its home port. (3)

The distance-time graph shows 4 hours of the journey.




Work out the speed of the ship during these 4 hours.

7. The sum of the angles in any quadrilateral is 360°. (2)

For example, in a rectangle, $4 \times 90° = 360°$.

Zak writes, "$5 \times 90° = 450°$ so the sum of the angles in any pentagon must be 450°."

Is he correct?
Tick a box.

☐ Yes ☐ No

Show working to support your answer.

8. Kim works at an airport in the UK.
She records the number of planes landing between 10 am and 2 pm each day.
The table shows the data for the first 10 days in January.

| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of planes | 148 | 151 | 147 | 155 | 153 | 147 | 155 | 102 | 151 | 154 |

(a) The airport was affected by fog on one of the days. (1)
Which day do you think it was?
Give a reason for your answer.

Kim uses the data to predict how many planes will land at the airport in a year.

In her method, she

- uses an estimate of 150 planes in each 4-hour period throughout the day assumes the same and
- number of planes each day.

(b) Work out her prediction. (3)

In fact,

- fewer planes land in winter than in summer and
- fewer planes land at night than during the day.

(c) What does this tell you about Kim's prediction? (2)
Tick **one** box.

☐ Her prediction is too low

☐ Her prediction is too high

☐ Her prediction could be too low or too high

Give a reason for your answer.

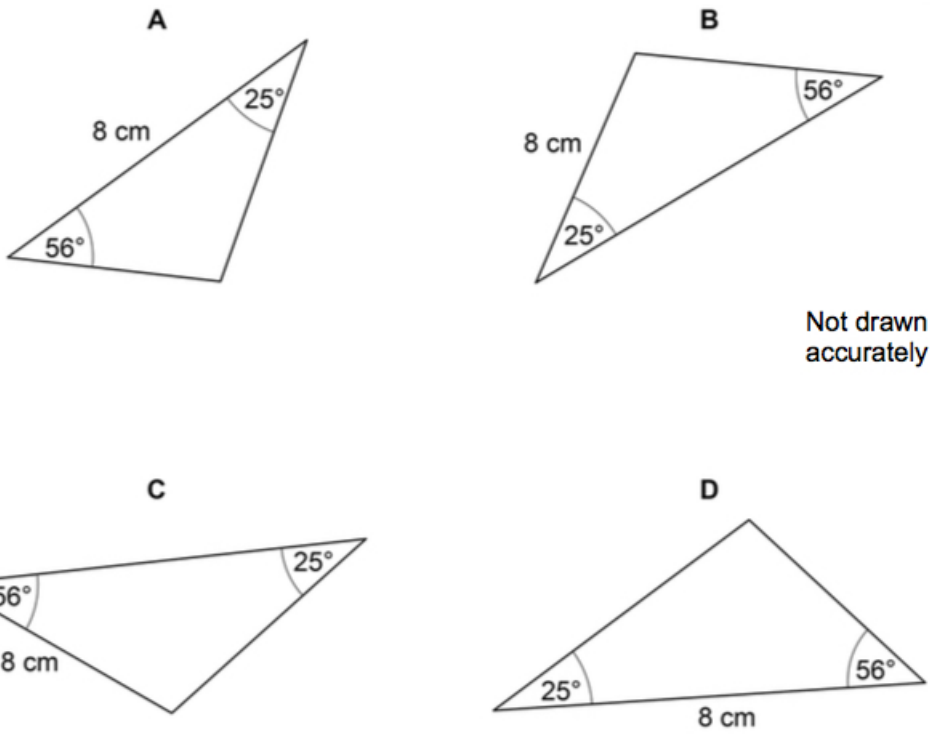
9. (4)

$$\sqrt{6^2 + 8^2} = \sqrt[3]{125a^3}.$$

Work out the value of $a$.

10. Work out the percentage increase from 80 to 280. (3)

11. Here are four triangles. (1)




Which **two** triangles are congruent?
Circle **two** letters below.

$A \quad B \quad C \quad D$

12. Solve (3)

$$x^2 - x - 12 = 0.$$

13. (3)

$$e : f = 2 : 3 \text{ and } f : g = 5 : 4.$$

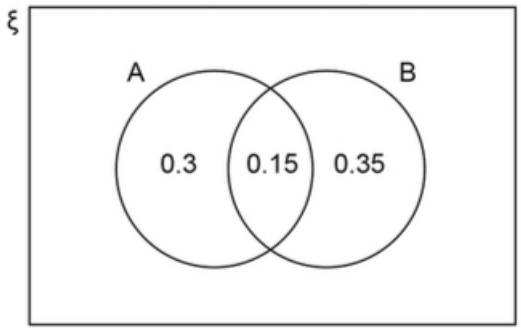
Work out

$$e : g.$$

Give your answer in its simplest form.

14. $A$ and $B$ are two events. (2)

Some probabilities are shown on the Venn diagram.



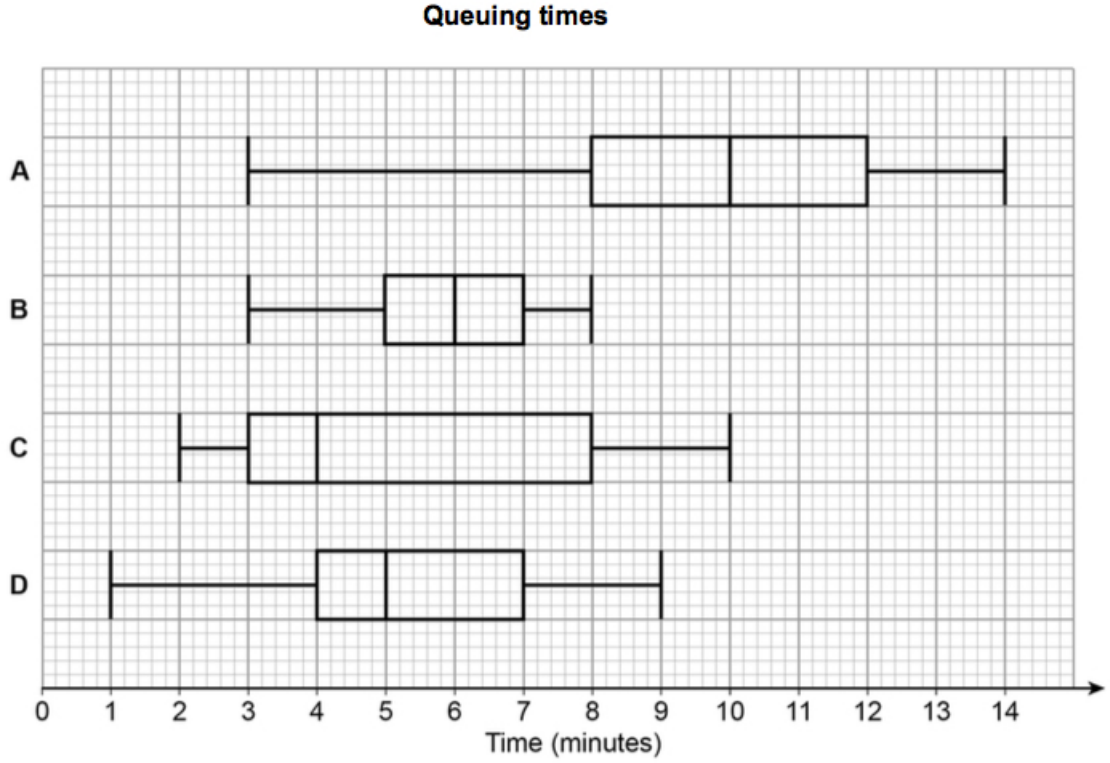

Work out

$$\mathrm{P}(A' \cup B).$$

15. In a survey, queuing times at supermarket checkouts were recorded.

One morning, samples of 50 customers were taken at supermarkets $A$, $B$, $C$, and $D$.

The box plots represent the results.




(a) On average, which supermarket had the lowest queuing times? (2)
Give a reason for your answer.

(b) At which supermarket were the queuing times most consistent? (2)
Give a reason for your answer.

16. Circle the number that is closest to the value of (1)

$$29^3.$$

27 000 90 2 700 9 000

17. Work out the exact value of (2)

$$(\tfrac{3}{4})^{-3}.$$

18. Beth and Mia translate documents from Spanish into English. (4)

A set of documents that would take Beth 8 days would take Mia 10 days.

Beth starts to translate the documents.

After 2 days Beth and Mia both work on translating the documents.

How many **more** days will it take to complete the work?

You **must** show your working.

19. In a chess club, there are $x$ boys and $y$ girls.

(a) If 5 more boys and 8 more girls join, there would be half as many boys as girls. (2)

Show that

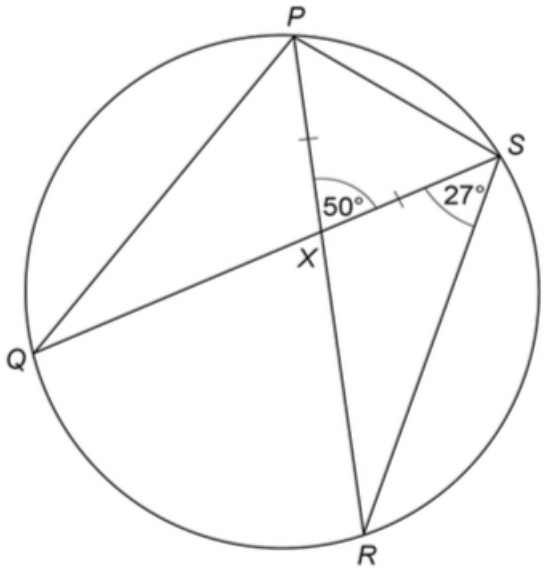
$$y = 2x + 2.$$

(b) If instead, 10 more boys and 1 more girl join, there would be the same number of boys and girls. (3)

Work out $x$ and $y$.

20. (4)

- $P$, $Q$, $R$, and S are points on a circle.
- $PXR$ and $QXS$ are straight lines.
- $PX = SX$.




Not drawn accurately

Prove that $QS$ is not a diameter of the circle.

21. Here are the first four terms of a quadratic sequence: (3)

11 26 45 68.

Work out an expression for the nth term.

22. Solve (4)

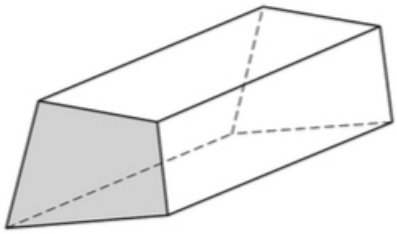
$$\frac{x}{x+4} + \frac{7}{x-2} = 1.$$

You **must** show your working.

23. Prisms $A$ and $B$ are similar. (5)
The cross sections are shaded.

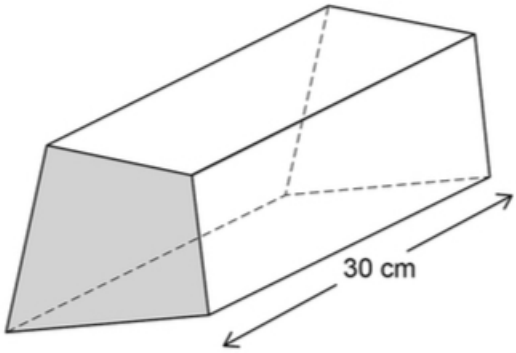
**Prism A**

volume = 480 $cm^3$



**Prism B**

length = 30 cm




Area of the cross-section of $A$ : area of the cross-section of $B = 4 : 9$.

Work out the area of the cross section of $B$.

24. Show that (3)

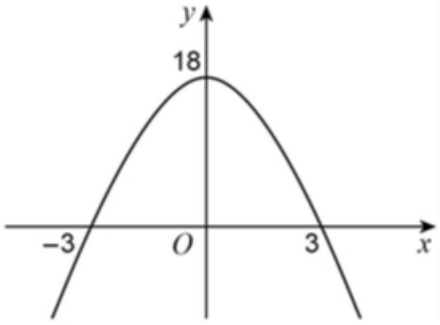
$$\frac{2\sqrt{6}}{\sqrt{5}} - \frac{\sqrt{3}}{\sqrt{10}}$$

can be written in the form

$$\frac{c\sqrt{d}}{10},$$

where $c$ and $d$ are integers.

25. A quadratic curve intersects the axes at $(-3, 0)$, $(3, 0)$, and $(0, 18)$. (3)

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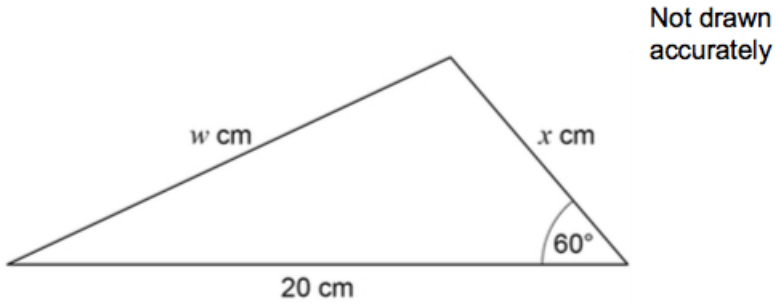
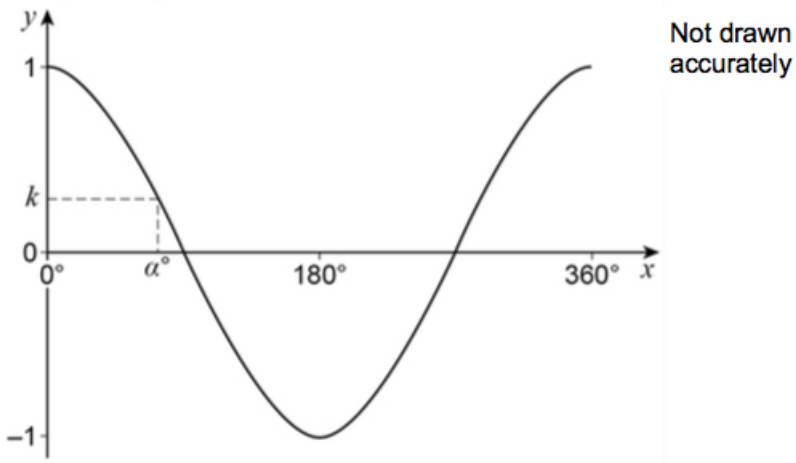
Work out the equation of the curve.

26. The area of this triangle is $25\sqrt{3}$ cm$^2$. (5)




Work out the value of $w$.
Give your answer in the form $a\sqrt{b}$, where $a$ and $b$ are integers greater than 1.

27. Here is a sketch of $y = \cos x$ for values of $x$ from $0^\circ$ to $360^\circ$.




$\alpha^\circ$ is an acute angle.
$\cos \alpha^\circ = k$.

(a) Circle the value of $\cos(180^\circ - \alpha^\circ)$. (1)

$$1 - k \quad k \quad -k \quad -1 - k$$

(b) Circle the value of $\cos(360^\circ + \alpha^\circ)$. (1)

$$k - 1 \quad k + 1 \quad -k \quad k$$