Oxford Cambridge and RSA

# GCSE (9-1) Mathematics

**J560/05** Paper 5 (Higher Tier)

## Question Set 4

**1.** In 2017, a chocolate bar had a mass of 250 g.
In 2018, the mass of the chocolate bar was reduced to 220 g.

Work out the percentage decrease in the mass of the chocolate bar from 2017 to 2018.

$$\frac{250-220}{250} \times 100 = \frac{30}{250} \times \frac{4}{100} = 12\ \%$$

12 ..... % **[3]**

**2.** Solve.

$6x - 10 = 4x + 1$

$6x - 4x = 10 + 1$

$2x = 11$

$x = \frac{11}{2}$

$x =$ $\frac{11}{2}$ ..... **[3]**

**3.** Solve by factorising.

$x^2 + 9x + 20 = 0$

sum : $4 + 5 = 9$
product : $4 \times 5 = 20$

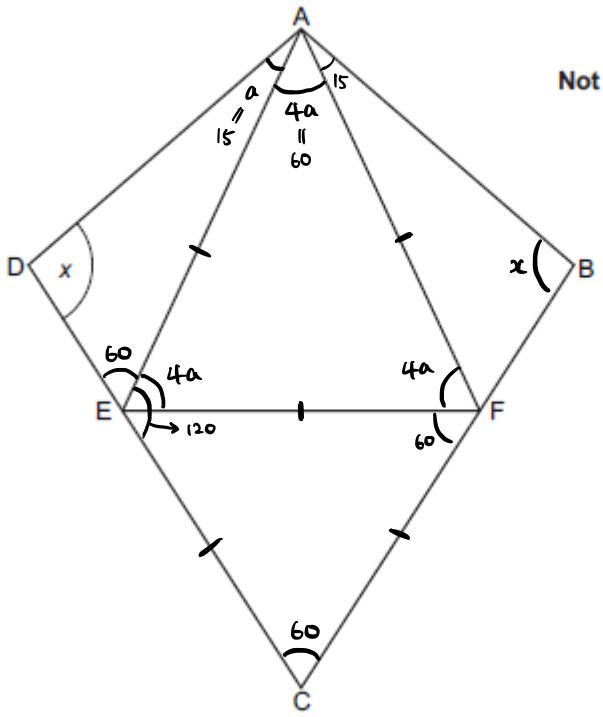
$(x + 4)(x + 5) = 0$

$x + 4 = 0$ or $x + 5 = 0$

$x = -4$ or $x = -5$

$x =$ $-4$ or $x =$ $-5$ **[3]**

**4.** The diagram shows a kite, ABCD.
AFE and CEF are equilateral triangles.




**(a)** Write down a mathematical name for quadrilateral AFCE.

**(a)** rhombus **[1]**

**(b)** The ratio of angle DAE : angle EAF = 1 : 4.

Work out angle *x*.
Write on the diagram the values of any other angles you use in your working.

$4a \times 3 = 180$ (60, 15)

$4 \times 3$

$a = 15$

$\angle AED = 180 - 120 = 60$

$180 - 15 - 60 = x$

$x = 105°$

**(b)** $x =$ 105 ° **[4]**

**5.** On a plane, $\frac{2}{5}$ of the passengers were British.

30% of the British passengers were men.
There were 36 British men on the plane.

Find the total number of passengers on the plane.

Total = $x$

$\frac{2}{5}x \times \frac{30}{100} = 36$

$\frac{3}{25}x = 36 \left(\times \frac{25}{3}\right)$

$x = 12 \times 25$

$x = 300$

300 passengers ..... [5]

**6.** A bag contains 100 pencils that are either red or green.

Describe a method you could use to estimate the number of red pencils in the bag without looking into the bag or having more than one of the pencils out of the bag at any one time.

Randomly take out a pencil from the bag an record its colour. Repeat at least 20 times Get the decimal / probability of red pencils and multiply it by the total number of pencils available in the bag (100) to get an estimate number. [4]

**7.** **(a)** **(i)** Write $\frac{1}{3}$ as a recurring decimal.

(a)(i) $0.\dot{3}$ [1]

**(ii)** Write $\frac{1}{30}$ as a recurring decimal.

(ii) $0.0\dot{3}$ [1]

**(b)** Simplify fully by rationalising the denominator.

$$\frac{20}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$$

$$= \frac{20\sqrt{5}}{5}$$

$$= 4\sqrt{5}$$

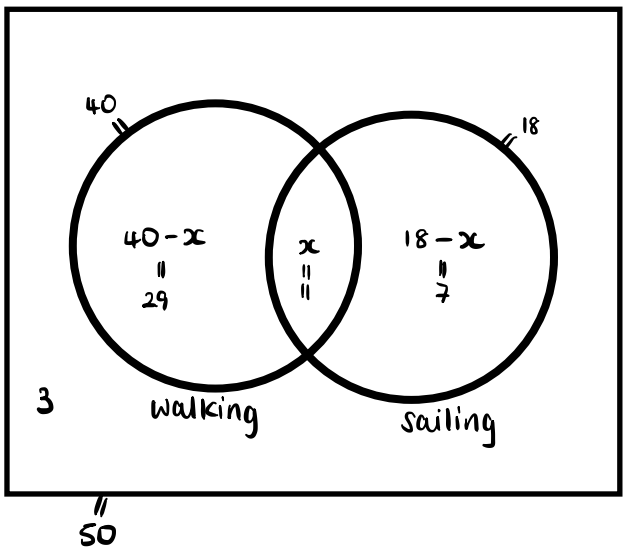
(b) $4\sqrt{5}$ [3]

**8.** 50 people attended an outdoor activity day.

- 40 took part in walking.
- 18 took part in sailing.
- 3 did neither activity.

One of the people who walked is chosen at random.

Find the probability that this person also sailed.




$(40-x)+x+(18-x)+3 = 50$

$61-x=50$

$x = 61-50$

$x = 11$

$\frac{11}{40}$

..... **[5]**

**9.** Show that $\sqrt[3]{a^4} \times \frac{1}{a}$ can be expressed as $a^{\frac{1}{3}}$. **[3]**

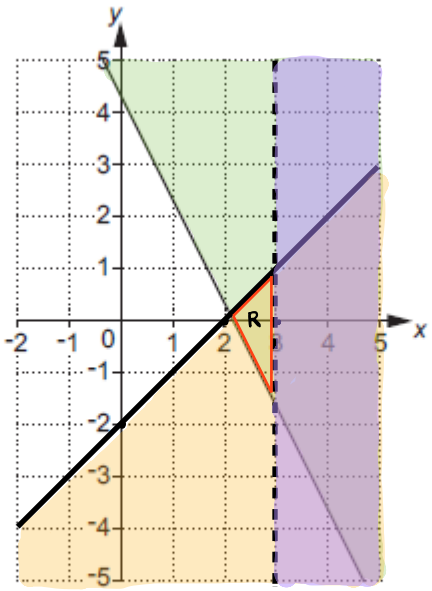
$\sqrt[3]{a^3 \times a} \times \frac{1}{a}$

$= a\sqrt[3]{a} \times \frac{1}{a}$

$= \sqrt[3]{a}$

$= a^{\frac{1}{3}}$

**10.** The graph of $3y + 6x = 13$ is drawn on the grid.




The region R satisfies these inequalities.

$3y + 6x \geqslant 13$ $y \leqslant x - 2$ $x > 3$

By drawing two more straight lines, find and label the region R. **[6]**

$x = 0, y = 0 \rightarrow 3y + 6x \geqslant 13$ $0 + 0 \geqslant 13$ ✗

$x = 0, y = 0 \rightarrow y \leqslant x - 2$ $0 \leqslant -2$ ✗

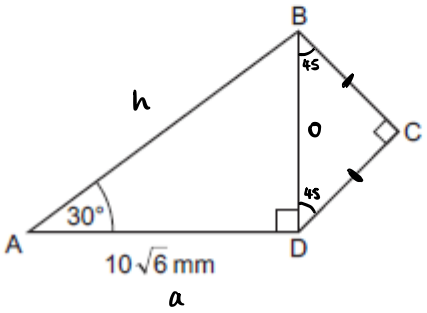
$x = 0 \rightarrow x > 3$ $0 > 3$ ✗

**11.** **(a)** Write down the value of sin 45°.

(a) $\frac{\sqrt{2}}{2}$ [1]

**(b)** ADB and BCD are right-angled triangles.
BC = CD.
AD = $10\sqrt{6}$ mm.
Angle BAD = 30°.

$\tan 30° = \frac{1}{\sqrt{3}}$

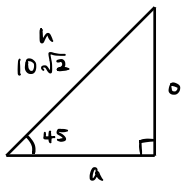



Not to scale

Work out the length of BC.

$\tan 30 = \frac{o}{10\sqrt{6}} = \frac{1}{\sqrt{3}}$ $(\times 10\sqrt{6})^2$

$o = 10\sqrt{2}$




$\sin 45 = \frac{o}{10\sqrt{2}} = \frac{\sqrt{2}}{2}$ $(\times 5\sqrt{2})$

$o = 5 \times 2 = 10$

(b) 10 mm [6]

**Total Marks for Question Set 4: 49**

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