# GCSE (9-1) Mathematics

**J560/06** Paper 6 (Higher Tier)

# Question Set 2

**1**  Tom researches the weights of plant seeds.

- One poppy seed weighs $3 \times 10^{-4}$ grams.
- 250 pumpkin seeds weigh 21 grams.
- One sesame seed weighs $3.64 \times 10^{-6}$ kilograms.

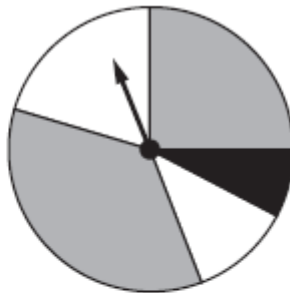Write the three types of seed in order according to the weight of one seed.
Write the lightest type of seed first.
You must show how you decide.

..............................., ..............................., ...........................[4]
lightest

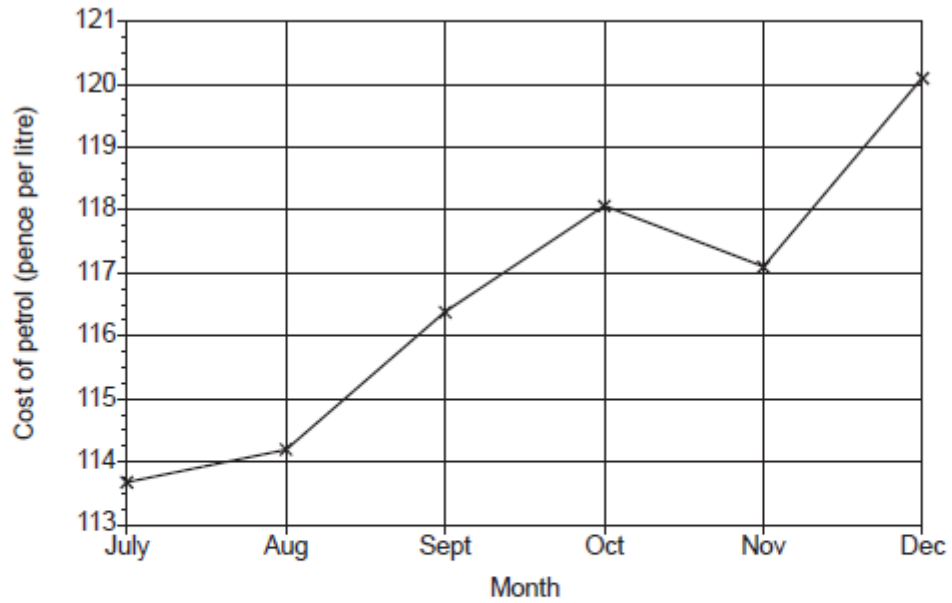**2 (a)**  (a) This spinner has two grey sections, two white sections and one black section.



Vlad says

The probability of the spinner landing on black is $\frac{1}{5}$.

Explain why Vlad is not correct.

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.............................................................................................................................. [1]

**(b)**

**(b)** The graph shows the cost of a litre of petrol for the last six months of 2017.



Explain why this graph is misleading.

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................................................................................................................................................................... **[1]**

**3**    ABC is a right-angled triangle.
AB = 20 cm and BC = 37 cm.
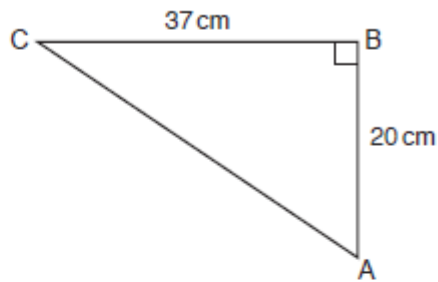


Not to scale

Calculate angle BAC.

.............................................................. ° **[3]**

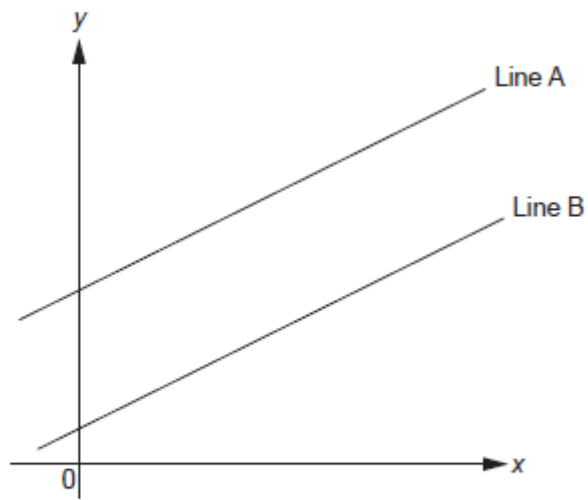**4**      A bag contains some counters.

- There are 300 counters in the bag.
- There are only red, white and blue counters in the bag.
- The probability of picking a blue counter is $\dfrac{23}{50}$.
- The ratio of red counters to white counters is 2 : 1.

Calculate the number of red counters in the bag.

........................................................ **[4]**

**5** The graph shows two parallel lines, Line A and Line B.



Line A has equation $y = 6x + 7$.
Line B passes through the point (4, 26).

Find the equation of Line B.

................................................................ **[4]**

**6** **(a)** **i**  You are given that

$$270 = 3^3 \times 2 \times 5 \quad \text{and} \quad 177147 = 3^{11}$$

**(a)** **(i)**  Find the lowest common multiple (LCM) of 270 and 177 147.
Give your answer using power notation and as an ordinary number.

(a)(i)  using power notation ...................................................................

as an ordinary number ................................................. **[2]**

**(a)** **ii**  **(ii)**  Write 177 147 000 000 as a product of its prime factors.

(ii)  ................................................................. **[3]**

**(b)**  **(b)**  $3^n = 177147 \times 9^5$.

Find the value of *n*.

(b)  *n* = ...................................................... **[3]**

**7**    The length of the longest diagonal of a cube is 25 cm.

Calculate the total surface area of the cube.

.................................................... cm² **[5]**

**8**   Solve by factorisation.

$$5x^2 + 7x + 2 = 0$$

$x =$ ............................ or $x =$ ............................ **[3]**

**9   (a)**   **(a)**  Show that the equation $x^4 - x^2 - 9 = 0$ has a solution between $x = 1$ and $x = 2$.   **[3]**

**(b)**

(b) Find this solution correct to 1 decimal place.
**Show your working.**

(b) $x =$ ....................................................... **[4]**

**10**

Toy building bricks are available in two sizes, small and large.
The small and large bricks are mathematically similar.

A small brick has volume $8\,cm^3$ and width 2.1 cm.
A large brick has volume $15.625\,cm^3$.

Calculate the width of a large brick.

..................................................... cm **[4]**

**11 (a)**

At the start of 2018, the population of a town was 17 150.
At the start of 2019, the population of the town was 16 807.

It is assumed that the population of the town is given by the formula

$$P = ar^t$$

where $P$ is the population of the town $t$ years after the start of 2018.

**(a)** Write down the value of $a$.

(a) ................................................. **[1]**

**(b)**

(b) Show that $r = 0.98$. [1]

**(c)**

(c) Show that the population is predicted to be less than 16 000 at the start of 2022. [2]

**(d)**

(d) Use the formula to work out what the population might have been at the start of 2017.

(d) ................................................................. [2]

# Total Marks for Question Set 2: 50