

Worksheet No. 1504

13+ Maths Non-Calculator

Total Marks: /24

Date:

1. What is the total cost of 50 stamps at 32p each?

$$\begin{aligned} \text{Total cost: } 50 \times 0.32 &= (100 \div 2) \times 0.32 \\ &= 100 \times (0.32 \div 2) \\ &= 100 \times 0.16 \\ &= 16.00 \end{aligned}$$

Answer: £16

(2)

2. (a) James paid a total of £7.52 for two loaves of bread, three boxes of eggs and a bag of bananas.

One box of eggs costs £1.55 and one loaf of bread costs 97p.

How much did the bag of bananas cost?

$$\begin{aligned} \text{Cost of two loaves of bread: } 2 \times 0.97 &= 2 \times (1 - 0.03) \\ &= 2 - 0.06 \\ &= £1.94 \end{aligned}$$

$$\begin{aligned} \text{Cost of three boxes of eggs: } 3 \times 1.55 &= 3 \times 1.5 + 3 \times 0.05 \\ &= 4.5 + 0.15 \\ &= £4.65 \end{aligned}$$

$$\begin{aligned} \text{Therefore the cost of a bag of bananas} &= £7.52 - £1.94 - £4.65 \\ &= £0.93 \end{aligned}$$

Answer: 93p

(4)

- (b) The following week, James purchases the same items. However, he finds that he spends 25% more in total. The eggs and bananas have remained the same price.

What is the new price of one loaf of bread?

$$\begin{aligned} \text{Extra spend: } £7.52 \times 25\% &= 7.52 \div 4 \\ &= 1.88 \end{aligned}$$

$$\begin{aligned} \text{Therefore new total spend:} &= 7.52 + 1.88 \\ &= £9.40 \end{aligned}$$

Therefore the cost of two loaves of bread is the total subtract the cost of eggs and bananas: £9.40 - £4.65 - £0.93 = £3.82

$$\begin{aligned} \text{Therefore the cost of one loaf of bread:} &= 3.82 \div 2 \\ &= £1.91 \end{aligned}$$

Answer: £1.91

(4)



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3. (a) Write each of the following numbers as the product of its prime factors:

(i) 20

$$20 = 2 \times 10 = 2 \times (2 \times 5)$$

Answer: $2 \times 2 \times 5$ (1)

(ii) 56

$$56 = 2 \times 28 = 2 \times (4 \times 7) = 2 \times (2 \times 2) \times 7 = 2 \times 2 \times 2 \times 7$$

Answer: $2 \times 2 \times 2 \times 7$ (2)

(b) Using your answer to part (a), or otherwise, write down

(i) the largest factor of both 20 and 56

$$\text{Largest number shared by both} = 2 \times 2 = 4$$

Answer: 4 (1)

(ii) the smallest multiple of 20 and 56

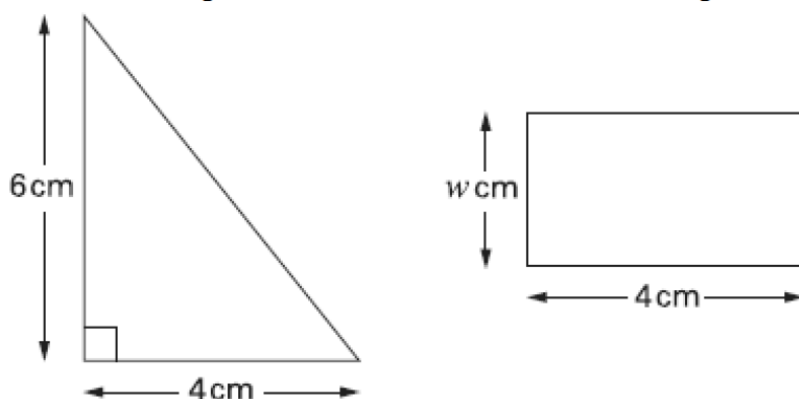
$2 \times 2 \times 2 \times 7 \times 5$ as the smallest number includes all of the factors of both numbers

$$\begin{aligned} 2 \times 2 \times 2 \times 7 \times 5 &= (2 \times 2 \times 7) \times (5 \times 2) \\ &= 28 \times 10 \\ &= 280 \end{aligned}$$

Answer: 280 (2)



3. The area of the triangle is three times the area of the rectangle.



Work out the value of w :

$$\begin{aligned} \text{Area of triangle} &= \frac{1}{2} \text{ base} \times \text{height} \\ &= \frac{1}{2} \times 4 \times 6 \\ &= 12\text{cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of rectangle} &= \text{base} \times \text{height} \\ &= 4w \end{aligned}$$

$$\begin{aligned} \text{Area of triangle} &= 3 \times \text{Area of rectangle} \\ 12 &= 3 \times 4w \\ 12 &= 12w \end{aligned}$$

$$\text{Therefore } w = 1$$

Answer: 1cm

(3)

4. There are 47 guests accommodated in 19 rooms of a hotel. Each room has either 2 or 3 beds. Assuming that every guest sleeps in one bed only and that every bed is used, determine the number of rooms with 2 beds, and the number of rooms with 3 beds.

(Hint: Let x represent the number of rooms with 2 beds, and y represent the number of rooms with 3 beds)

$$\begin{aligned} \text{Total number of rooms} &= \text{Rooms with 2 beds} + \text{Rooms with 3 beds} \\ \text{(i): } 19 &= x + y \end{aligned}$$

$$\begin{aligned} \text{Total number of guests} &= \text{Guests in 2 bed rooms} + \text{Guests in 3 bed rooms} \\ \text{(ii): } 47 &= 2x + 3y \end{aligned}$$

Solve simultaneous equations:

$$\begin{aligned} \text{(i)} \times 2 = \text{(iii):} & \quad 38 = 2x + 2y \\ \text{(ii)} - \text{(iii):} & \quad 47 - 38 = (2x - 2x) + (3y - 2y) \\ & \quad 9 = y \end{aligned}$$

$$\text{From (i):} \quad x = 19 - y = 10$$

Answer: 10 2 bed rooms
9 3 bed rooms

(5)

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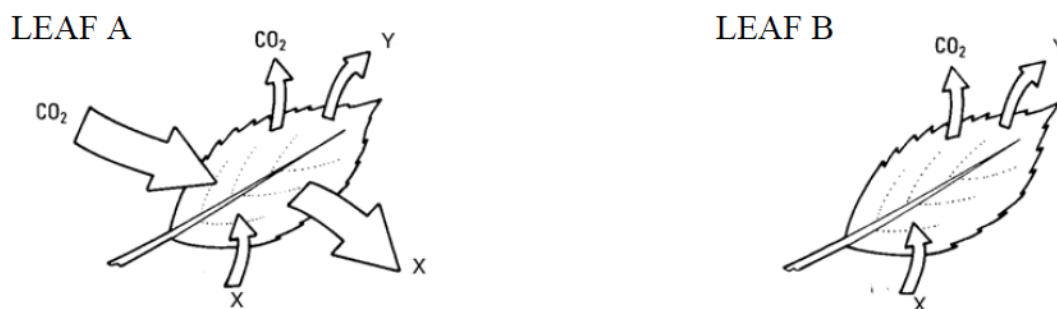
13+ Science

Total Marks: _____/29

Date: _____

Biology

1. The diagram below shows two leaves with arrows indicating substances entering and leaving the leaf. One leaf is shown in day conditions and the other is shown in night conditions.



- (a) Name and write word equations for the two processes taking place in Leaf A. (4)

Respiration:

Glucose + Oxygen -> Water + Carbon Dioxide

Photosynthesis:

Water + Carbon Dioxide -> Glucose + Oxygen

- (b) How do you know which leaf is in daylight? (3)

Leaf A is the daylight.

Both respiration and photosynthesis are taking place in Leaf A.

The process of photosynthesis requires light.

- (c) In Leaf A carbon dioxide is shown both entering and leaving the leaf. Will more enter or leave the leaf? (1)

More carbon dioxide will enter the leaf.

- (d) Suggest an identity for gas X. (1)

Oxygen.

- (e) Through which structure in the leaf do gases enter and leave? (1)

Stomata.

- (f) Substance Y is shown to leave the leaf. Where does the plant take this up? How is its structure adapted for this role? (2)

The roots.

Root hairs increase the surface area to absorb water from the soil.

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Chemistry

2. The table shows some properties of three substances at room temperature.

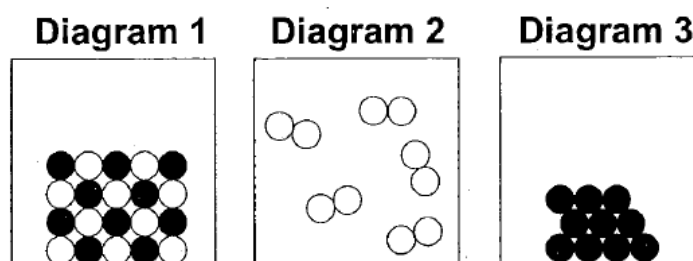
Substance	Colour	State
A	Green	Gas
B	Silvery	Solid
C	White	Solid

- (a) Substance **A** reacts with substance **B** to make substance **C** only. (1)

Give one piece of evidence from the table that suggests that a chemical reaction has occurred.

The colour of the solid has changed from silvery to white.

The diagrams below represent the arrangements of particles in substances **A**, **B** and **C**



- (b) Which diagram represents substance **A**? How did you get to your answer? (2)

Diagram 2

Substance A is a gas, and diagram 2 is the only diagram that shows molecules that are filling the volume.

- (c) Which diagram represents the product of the reaction between **A** and **B**? How did you get to your answer? (2)

Diagram 1.

The substance in Diagram 1 is made up from two different types of atom – found in Diagram 2 and 3 – suggesting that a reaction has taken place.

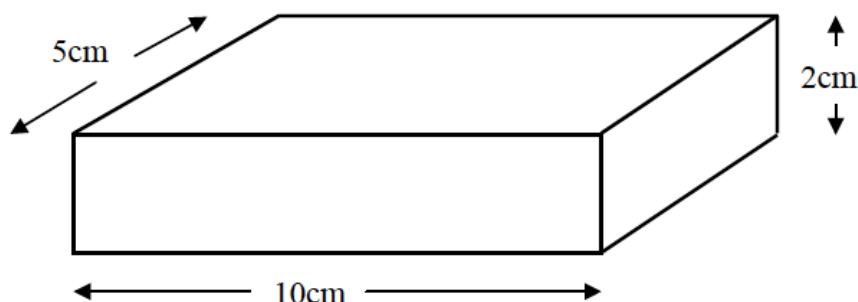
- (d) 2.7g of substance **A** reacts with substance **B** to make 6.4g of substance **C**. What mass of substance **B** reacted? (1)

$$6.4 - 2.7 = 3.7g$$

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Physics

3. A block of gold is shown below.



- (a) Calculate the volume of the block (2)

$$\begin{aligned} \text{Volume} &= \text{length} \times \text{height} \times \text{breadth} \\ &= 10 \times 2 \times 5 \\ &= 100\text{cm}^3 \end{aligned}$$

- (b) The mass of the block is 1930g. Calculate the density of gold using the formula density = mass ÷ volume. Give the unit for your answer. (3)

$$\begin{aligned} \text{density} &= \text{mass} \div \text{volume} \\ &= 1930 \div 100 \\ &= 19.3 \text{ g/cm}^3 \end{aligned}$$

- (c) On Earth, a 100g block weighs 1N. What is the weight of above block of gold? (1)

A 100g block weighs 1N. Therefore a 1930g block weighs 19.3N

- (d)



A King has had his crown of pure gold repaired by his goldsmith . The King becomes suspicious that the goldsmith has swapped the crown.

- Using the value found in (b), describe a test to determine whether the crown is made of pure gold. (5)

To calculate density of an object, we need to know its mass and volume. The mass of an object can be found using a mass balance.

The volume of an irregularly shaped object can be found by measuring how much water it displaces.

The crown can be placed in a tank of water, and the volume of water displaced will equal the volume of the crown.

The density can then be found using density = mass ÷ volume.

And compared with the value of 19.3 g/cm³ to determine whether the crown is pure gold.