**Skill Sheet: Fractions and Percentages**

***What You Need to Know:***

Fractions show parts of whole numbers. For example, the fraction 1/3 shows a number that is 1 part out of 3, or a third. The number above the line is called the numerator, and the number below the line (that it is a proportion of) is called the denominator.

½ =

0.5

¼ = 0.25

⅛ = 0.125

⅓

⅓

⅓

To add or subtract fractions, the denominators need to be the same – this can be achieved by using equivalent fractions with a common denominator. E.g. to add 1/8 + 1/6 use a common denominator of 24. 1/8 = 3/24 and 1/6 = 4/24. Hence 1/8 + 1/6 = 3/24 + 4/24 = 7/24.

A decimal value can be calculated by carrying out the division. E.g. 1/8 = 0.125. Mathematical operations such as addition and multiplication can be applied to decimal values directly.

***Examiners***

***Top Tip***

*Always present fractions using the lowest integer value of the denominator; e.g. 8/24 = 1/3 and 4/16 = 1/4.*

Percentages are a type of fractions, showing the parts per hundred. They can be calculated by multiplying a decimal by 100. E.g. 0.125 x 100 = 12.5 %.

You might be asked to use fractions or percentages when, for example, analysing responses to user questionnaires or calculating the percentage of a material that is used or wasted.

***Example:***

A questionnaire about preferred colours was answered by 180 users. 3/8 of the users stated that their preferred choice was the colour blue. 1/4 of the users stated that their preferred choice was red. The rest of the users had no preference.

1. Calculate the number of users who stated that their preference was the colour red.
2. Calculate the percentage of the users who did not have a preference.

***Answer:***

1. 1/4 x 180 = 45 users
2. 3/8 + 1/4 = 3/8 + 2/8 = 5/8; those with no preference = 1 – 5/8 = 3/8

As a percentage, 3/8 x 100/1 = 37.5%

***Now Try These:***

1. A can of paint contained 4.5 litres. 1/3 of the can was used to paint a product.

Calculate the amount of paint remaining, in litres.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. 81 who answered a questionnaire stated that a product should cost less than £10. If a total of 90 people answered the questionnaire, what percentage stated that the product should cost less than £10.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Practice Sheet: Fractions and Percentages**

***Now Try These:***

1. A school used a questionnaire to ask its GCSE D&T students which material type they wanted to use for their Non-Exam Assessment. 60 students gave responses. The results are shown in figure 1.

**Figure 1**

Calculate the percentage of students who wanted to use electronics.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. A company stores plastic granules in a hopper. Initially the hopper is full and holds 120 kg of the granules. 1/2 of the granules in the hopper were used to make products. Due to a spillage, 1/6 of the granules in the hopper were lost as waste.

Calculate the weight of polymer granules that needs to be added to the hopper to fill it back up.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. A company is manufacturing the washer represented by the white area in figure 2, from a square piece of metal with sides 30 mm long. The external diameter of the washer is 24 mm and the internal diameter is 12 mm. Calculate the percentage of material that is waste (not part of the washer).

**Figure 2**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Answers:**

**Skill Sheet: Fractions and Percentages**

1. 1 – 1/3 = 2/3; 2/3 x 4.5 = 3 litres
2. 81/90 x 100/1 = 90 %

**Practice Sheet: Fractions and Percentages**

1. 14 / 60 x 100 / 1 = 23.3 %
2. 1/2 + 1/6 = 3/6 + 1/6 = 4/6 = 2/3; 2/3 x 120 = 80 kg
3. Area of metal = 30 x 30 = 900 mm2

External radius of washer = 24 / 2 = 12 mm; internal radius of washer = 12 / 2 = 6 mm

Area of washer = π r12 - π r12 = π 122 - π 62 = 339.3 mm2

Percentage of waste material = ((900 - 339.3) / 900) x 100/1 = 62.3 %