Answers

Task 1

1. Carbon fibre is a very strong composite material made from thermoset polymer and carbon fibres. It is used to make bike frames, car chassis and running blades.

 A bike frame design has a mass of 1.75 kg. If the ratio of polymer to carbon fibre is
3 : 4, calculate the mass of polymer and carbon fibre are needed to manufacture 100
bike frames.

|  |  |
| --- | --- |
| **Polymer:** | **Carbon fibre:** |
| 3 + 4 = 7$\frac{1.75}{7}=0.25$ kg0.25 × 3 = **0.75 kg** | 1.75 – 0.75 = **1 kg**Or 3 + 4 = 7$\frac{1.75}{7}=0.25$ kg0.25 × 4 = **1 kg** |

2. Epoxy resin is a thermoset adhesive which is made by adding a resin to a hardener. Study the design of the epoxy resin dispenser below and estimate the ratio of resin to hardener being dispensed.

 **1 : 1**



3. A particular type of stainless steel contains iron, nickel and chromium in the ratio of
47 : 35 : 18 by mass.

 How much iron, nickel and chromium are present in 20.0 kg of stainless steel?

 47 + 35 + 18 = 100 parts

Iron: $\frac{47}{100}$ × 20 = **9.4 kg**, nickel $\frac{35}{100}$ × 20 = **7 kg**, chromium, $\frac{18}{100}$ × 20 = **3.6 kg**

Task 2

1. Calculate the following:

(a) A student makes a wooden chair in which $\frac{1}{4}$ of the total cost is teak and $\frac{1}{3}$ of the cost is pine. The remaining costs were made up of components and finishes.

 If the total cost of the chair was £52.50, work out the cost of the teak and the cost of the pine to the nearest penny.

Cost of teak = $\frac{1}{4}$ x £52.50 = **£13.13**

Cost of pine = $\frac{1}{3}$ x £52.50 = **£17.50**

(b) The average car engine weighs 158 kg.

 The ratio of the mass of the engine to the mass of the car is 1 : 11.

 What is the mass of the car?

158 x 11 = **1738 kg**

2. In a school, there are 40 students studying GCSE Design and Technology this year.
The number of students studying GCSE Design and Technology this year is an increase of $\frac{1}{4}$ on the numbers studying the course the previous year.

 How many students studied the course the previous year?

Let *N* = the number of students **last** year.

Number of students **this** year = number of students **last** year + $\frac{1}{4}$ of the students **last** year.

40 = *N* + $\frac{1}{4}$ *N*

40 = $\frac{5}{4}$ *N*

40 x $\frac{4}{5}$ = **32 students**