Ratio, Proportion and Rates of change – 2022 GCSE Mathematics Higher

1. June/2022/Paper_J560/04/No.6

A machine can dig, on average, 2 cm of tunnel each minute.
It operates 24 hours each day.

(a) Work out how many days it should take to dig a tunnel of length 3.5 km.
Give your answer to the nearest day.

(a) .... days **[4]**

b) The machine actually digs an average of 2.5 cm of tunnel each minute for most of the time
and an average of 1.5 cm each minute for the rest of the time.

How would this affect your answer to part **(a)**?

....

.... **[1]**

2. June/2022/Paper_J560/04/No.13

Here is a restaurant's menu.

Starter	Main	Dessert
Prawn Cocktail	Hunter's Chicken	Trifle
Duck Spring Rolls	Beef Curry	Ice Cream
Lamb Meatballs	Steak	Cheesecake
Leaf Salad (V)	Fish Pie	Chocolate Cake
Mushroom Soup (V)	Lasagne	Bakewell Tart
	Egg Salad (V)	Fruit Salad (V)
	Vegetable Hot Pot (V)	Cherry Pie (V)
	Macaroni Cheese (V)	

(V) denotes vegetarian

(a) A 3-course meal consists of one starter, one main and one dessert.

Work out how many different 3-course meals can be chosen from the menu.

(a) .... **[2]**

(b) Find the fraction of the 3-course meals which are completely vegetarian (V).

(b) .... **[2]**

2

3. June/2022/Paper_J560/05/No.5

Recipes measure small quantities in teaspoons and tablespoons.
3 teaspoons is equivalent to 1 tablespoon.

A cake recipe uses $\frac{3}{4}$ of a teaspoon of salt and 1 tablespoon of baking powder.

The ratio of salt to baking powder used in the recipe can be written in the form 1 : n.

Find the value of n.

$n =$ .... **[3]**

4. June/2022/Paper_J560/05/No.11

y is inversely proportional to x^2.
$y = 9$ when $x = 2$.

Find the value of y when $x = 10$.

$y =$ .... **[3]**

5. June/2022/Paper_J560/06/No.6

The mass of a stone is 680 g.
The density of the stone is 1.6 g/cm³.

(a) Work out the volume of the stone.

(a) .... cm³ **[2]**

(b) Write 1.6 g/cm³ in kg/m³.

(b) .... kg/m³ **[1]**

6. June/2022/Paper_J560/06/No.11

Amir, Beth and Charlie work in a cafe.
Customers give spare change as tips.
At the end of each week, Amir, Beth and Charlie share the total amount of tips between them in the ratio matching the number of hours they worked that week.

This week:

- Amir's share of the tips was £25.40.
- Beth worked twice as many hours as Amir.
- Charlie worked 5 more hours than Amir.
- The total hours worked by Amir, Beth and Charlie was 85 hours.

Calculate the total amount of tips received this week.
You must show your working.

£ .... **[6]**