

MATHEMATICS : HIGHER

YR 10 SUMMER HW

1 The audience in a theatre is made up of the following ratio:

men : women : children = 3 : 4 : 5

a There are 348 people in the audience. Calculate the number of men.

b What fraction of the audience are women?

c What percentage are children?

d Another night the audience was made up of the following ratio:

men : women : children = 2 : 5 : 6

One of the officials recorded that there were 310 people in the audience.
He made a mistake in writing this figure down. Explain how you know this.

2 a Rhian measures the height of one of her tomato plants as 20 cm.
The next week it is 15% taller. What is its new height?

b Another tomato plant grows from 240 cm to 312 cm.
Calculate the percentage change in height.

3 Geoff filled the petrol tank in his car with unleaded petrol.

The petrol cost him £52.65.

a How many litres did he buy?

- b** How much more would it have cost Geoff if he had filled his petrol tank with super unleaded instead?

Unleaded Petrol £1.17 per litre
Super Unleaded £1.22 per litre

- 4 a** Write 48, 180 and 108 each as a product of its prime factors.

- b** Find the highest common factor of 48, 180 and 108.

- c** What is the lowest common multiple of 48, 180 and 108.

- 5** Show clearly how you would obtain an estimate for this calculation:

$$\frac{607 \times 4.97}{0.214}$$

- 6** Work out each of the following:

a $7\frac{3}{8} + 2\frac{1}{2} - 3\frac{2}{3}$

- b** The reciprocal of 5 divided by the square root of $\frac{1}{4}$.

- 7** Use the rules of indices to simplify the following.
Give your answers in index form.

a $4^3 \times 4^5$ **b** $3^8 \div 3^2$ **c** $(t^4)^3$ **d** $\frac{m^9}{m^2 \times m^4}$

- 8 a** The cost of 5 metres of wire is £4.
What is the cost of 8 metres of the same wire?

- b** It takes 3 men 4 days to build a wall.
How long would it take 2 men to build the same wall?

9 a Write down any irrational number.

b $\sqrt{30} < x < \sqrt{40}$

x has a rational value. Write down a possible value for x .

c $2 < y < 3$

y has an irrational value. Write down a possible value for y .

10 a Express $\frac{5}{11}$ as a recurring decimal.

b Which of the following fractions are recurring decimals?

$$\frac{7}{18} \quad \frac{13}{20} \quad \frac{2}{35} \quad \frac{19}{25} \quad \frac{11}{16}$$

c Write the recurring decimal 0.4444... as a fraction.

11 a Write each of the following in standard index form

i 27 300 000 **ii** 0.00000000006

b Find, in standard index form, the value of each of the following

i $(1.25 \times 10^{-4}) \times (9.4 \times 10^{-5})$ **ii** $\frac{8.88 \times 10^4}{1.2 \times 10^{-3}}$

12 Luke buys a new car for £35 000.

By the end of each year the car has lost 20% of its value at the beginning of that year.

a How much is the car worth when it is one year old?

b How much is the car worth when it is four years old?

13 A dealer buys items from auctions and sells them via the internet.
a He buys a painting for £56 and makes a profit of 65% when he sells it.
What does he sell it for?

b Another time he makes a profit of 40% on a table which he sells for £112.
What did he buy the table for?

c Once he made a loss of 55% when he sold a bureau for £162.
What had he paid for the bureau?

14 The power, P , of a car is proportional to the velocity, v .
When $P = 3000$ watts, $v = 8$ metres per second.

a Find a formula for P in terms of v .

b Find the power, P , when $v = 5.2$ metres per second.

15 The length and width of a rectangle are 8 cm and 5 cm, each measured to the nearest centimetre.

a Write down the upper and lower bounds of the length of the rectangle.

b Write down the upper and lower bounds of the width of the rectangle.

c Find the difference between the maximum and minimum possible areas.

16 Calculate the value of $(4.41 \times 10^{-2})^{\frac{1}{2}}$

17 Simplify:

a 8^0 **b** 3^{-2} **c** $25^{\frac{1}{2}}$ **d** $27^{\frac{2}{3}}$ **e** $625^{-\frac{2}{4}}$

18 Simplify each of these expressions containing surds:

a $\sqrt{3} \times \sqrt{5}$ **b** $5\sqrt{3} \times \sqrt{3}$ **c** $\sqrt{28}$ **d** $\sqrt{2\frac{1}{4}}$ **e** $\frac{6}{\sqrt{2}}$

