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- 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?

<p>Unleaded Petrol £1.17 per litre</p> <p>Super Unleaded £1.22 per litre</p>
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- 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 $\frac{m^9}{m^2 \times m^4}$

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- 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?
- $\frac{7}{18}$ $\frac{13}{20}$ $\frac{2}{35}$ $\frac{19}{25}$ $\frac{11}{16}$
- 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 $(4.41 \times 10^{-2})^{\frac{1}{2}}$

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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** $\frac{6}{\sqrt{2}}$

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