Estimation Show That

Show how the calculation gives the estimated answer.

Question	Calculation	Estimated Answer
1	$213 + 456$	700
2	$748 - 97$	600
3	34×49	1500
4	$214 \div 52$	4
5	4.3^2	16
6	$\frac{109 + 376}{48}$	10
7	$(77 - 18) \times 3.2$	180
8	$6.7^2 + 231$	249
9	$2.6 \times 4.1 - 3.2^2$	3
10	$\frac{228 + 417}{380 - 123}$	2
11	$(5.6^2 - 2.7^2) \times 3.12$	81
12	$(5.6 - 2.7)^2 \times 312$	2700
13	$\frac{708 - 43.8}{4.3^2 + 3.9}$	33
14	$(2.1^3 + 6.8^2) \times 2.1$	114
15	$5.7^2 + (3.6 - 7.1)^2$	45

Changing Percentages into Fractions & Decimals

A. Change the following percentages into fractions. Simplify your answers as far as possible.

1) 50% =

2) 20% =

3) 1% =

4) 2% =

5) 4% =

6) 70% =

7) 5% =

8) 80% =

9) 6% =

10) 15% =

11) 28% =

12) 35% =

13) 90% =

14) 64% =

15) 22% =

B. Change the following fractions into percentages.

1) $\frac{1}{4}$ =

2) $\frac{1}{10}$ =

3) $\frac{3}{4}$ =

4) $\frac{2}{5}$ =

5) $\frac{9}{50}$ =

6) $\frac{2}{25}$ =

7) $\frac{17}{20}$ =

8) $\frac{3}{10}$ =

9) $\frac{17}{50}$ =

10) $\frac{9}{20}$ =

11) $\frac{4}{25}$ =

12) $\frac{49}{50}$ =

13) $\frac{24}{25}$ =

14) $\frac{3}{5}$ =

15) $\frac{19}{20}$ =

C. Change the following percentages into decimals.

1) 25% =

2) 50% =

3) 10% =

4) 20% =

5) 75% =

6) 150% =

D. Change the following decimals into percentages.

1) 0.03 =

2) 0.05 =

3) 0.35 =

4) 0.42 =

5) 0.72 =

6) 1.09 =

Worksheet #10 **Adding & Subtracting Fractions**

Add or subtract as indicated. Reduce to lowest terms.

1 $\frac{12}{17} + \frac{3}{17}$

2 $\frac{11}{12} + \frac{1}{12}$

3 $\frac{7}{10} + \frac{2}{10} + \frac{8}{10}$

4 $\frac{1}{2} + \frac{2}{3}$

5 $\frac{3}{8} + \frac{1}{2}$

6 $\frac{5}{6} + \frac{1}{4}$

7 $\frac{8}{11} - \frac{5}{11}$

8 $\frac{7}{16} - \frac{5}{16}$

9 $\frac{7}{9} - \frac{2}{3}$

10 $\frac{2}{3} - \frac{1}{6}$

11 $\frac{47}{50} - \frac{3}{10}$

12 $\frac{1}{2} - \frac{1}{5}$

GCSE MATHEMATICS Intermediate Tier, topic sheet.
PROPORTION and RATIO

NON CALCULATOR.

1. John made a scale model of an aeroplane using a scale of 1 : 50.

   a) The length of his model is 0·75 m. Calculate the length of the aeroplane.

   b) The aeroplane has a wingspan of 30m. What is the wing span of the model? Give your answer in centimetres.

2. A model of a car is built to a scale of 1 : 30.

   a) The height of the real car is 1.8 m. How high is the model car?

   b) The length of the model car is 11 cm. How long is the real car?

3. Railtrack have stated that trains which now travel at average speeds of 120 m.p.h. will, in the future, be able to average 140 m.p.h. How much time would be saved on a journey of 210 miles?

4. Split £120 in the ratio 7 : 5.

5. Orange makes up $\frac{2}{5}$ of a drink. How much orange is there in 470 ml of the drink?

6. Bob has £2500. He uses $\frac{1}{5}$ of the £2500 to buy a hi–fi. He puts $\frac{1}{4}$ of the amount he has left after buying the hi–fi into a bank.

   a) How much money remains after the above amounts have been taken away?

   b) What fraction of the £2500 remains after the above amounts have been taken away?

7. A sample of boys and girls at a school yielded the following results for their hair colour.

	Dark haired	Fair haired	Red haired	Total
Boys	40	55	5	100
Girls	40	35	15	90

There are 740 boys and 810 girls at the school. Use the results of the sample and these totals to find an estimate for the total number of pupils in the school with dark hair.

8. Tina wishes to put red, green and blue balls into a bag in the ratio of 4 : 9 : 17 respectively.
She has plenty of red and blue balls, but she only has 29 green balls.
She uses as many of her green balls as she can.

a) How many green balls will she put in the bag?

b) How many red balls will she put in the bag?

CALCULATOR ALLOWED.

9. a) Susan changed £500 into South African Rand, when the rate of exchange was £1 = 9.90 Rand. How many Rand did she get?

b) i) During her holiday Susan spent 4005 Rand. How many Rand did she have left?

ii) She changed her remaining Rand into pounds, when the exchange rate was £1 = 10.50 Rand.
How many pounds did she get?

10. The following is a list of ingredients to make 24 scones.

480g flour	80g sultanas	120g margarine
150ml milk	48g sugar	2 pinches of salt

Calculate how much salt, flour and milk would be needed to make 36 scones.

SOLUTIONS / ANSWERS.

1. a) Scale 1 : 50 means that the real plane is 50 times larger than the model.

Length of real plane $= 50 \times 0.75 = 37.5$ m.

b) Scale 1 : 50 means that the model plane is $\frac{1}{50}$'th the size of the real plane.

Wingspan of model $= 30 \text{ m} \div 50 = 0.6$ m or 60 cm.

2. Similar to Q1. a) 6 cm. b) 330 cm.

3. Calculate the times taken to travel 210 miles at the two different speeds.

At 120 m.p.h. 120 miles in 1 hour = 120 miles in 60 minutes

$\div 60$

= 2 miles in 1 minute

$\times 105$

= 210 miles in **105 minutes**.

At 140 m.p.h. 140 miles in 1 hour = 140 miles in 60 minutes

$\div 2$

= 70 miles in 30 minutes

$\times 3$

= 210 miles in **90 minutes**.

So, time saved = 105 – 90 minutes = 15 minutes.

4. Splitting £120 between two people in the ratio 7 : 5 means that the first person gets 7 *shares* and the second person receives 5 *shares*. This gives a total of 7 + 5 = 12 shares.

Each share is thus worth £120 ÷ 12 = £10.

So, the first person gets 7 × £10 = £70 and the second person gets 5 × £10 = £50.

5. We require $\frac{2}{5}$ of 470. $\frac{1}{5}$ of $470 = \frac{470}{5} = \frac{940}{10} = 94$ ml.

Thus $\frac{2}{5}$ of $470 = 2 \times 94 = 188$ ml.

6. a) Price of hi-fi = $\frac{1}{5}$ of £2500 = £500. This leaves £2000 after buying the hi-fi.

$\frac{1}{4}$ of the remaining £2000 goes into the bank. This means that £500 goes into the bank.

We are thus left with £2000 – £500 = £1500.

INDICES and SURDS

1) Simplify the following:

a) $\left(a^4\right)^5$ b) $\left(x^2\right)^7$ c) $\left(a^3b^2\right)^3$

d) $\left(p^3q^5\right)^4$ e) $x^{10} \div x^6$ f) $a^7 \div \mathrm{a}^5$

g) $p^{12} \div p^4$ h) $15p^6 \div 5p^4$ i) $21a^4 \div 7a^4$

j) $10a^{15} \div \left(a^2\right)^3$ k) $4\left(a^3\right)^5 \div 2a^8$ l) $16\left(a^2\right)^5 \div 2a^8$

m) $8\left(x^2\right)^5 \div 4x^3$ n) $20\left(x^3\right)^6 \div 5\left(x^2\right)^7$ o) $15a^3b^6 \div 3ab^4$

p) $18a^3b^2c^4 \div 6abc$ q) $20\left(a^3b\right)^3 \div 5ab^3$ r) $27a^2bc^2 \times 2(ab)^2$

s) $6a^2bc^3 \times 2a^2bc \div 3a^2b^2c$ t) $9xy^4 \times 2x^5yz^3 \div 6\left(x^2yz\right)^2$.

2) Evaluate the following without a calculator. **Show your working in full.**

a) $64^{\frac{1}{2}}$ b) $4^{-\frac{1}{2}}$ c) 2^{-3} d) 3^{-2} e) $\left(\frac{1}{2}\right)^2$ f) $\left(\frac{1}{2}\right)^{-2}$

g) $\left(\frac{1}{3}\right)^{-2}$ h) $27^{\frac{1}{3}}$ i) $27^{\frac{2}{3}}$ j) $\left(\frac{9}{4}\right)^{\frac{1}{2}}$ k) $(-2)^2$ l) $(-2)^3$

m) $\left(6\frac{1}{4}\right)^{\frac{1}{2}}$ n) $\left(\frac{9}{4}\right)^{-\frac{1}{2}}$ o) $100^{\frac{3}{2}}$ p) $\left(10^{-6}\right)^{\frac{1}{3}}$ q) $4^{-\frac{3}{2}}$ r) 1^6.

3) Express the following in the form a^n, stating the value of n.

a) $\sqrt{a} \times a$ b) $\frac{1}{a}$ c) $\frac{1}{\sqrt{a}}$ d) $\left(\sqrt{a}\right)^{\frac{4}{3}}$ e) $\frac{1}{\left(\sqrt{a}\right)^{\frac{4}{3}}}$

f) $\sqrt{a^{\frac{8}{3}}}$ g) $\frac{1}{\sqrt{a^{\frac{16}{5}}}}$ h) $a^2 \div \sqrt{a}$ i) $\frac{1}{\sqrt[3]{a^2}}$ j) $\frac{a}{\sqrt[4]{a}}$.

4) Express the following as algebraic fractions in their simplest form.

E.g. $\left(25a^8\right)^{-\frac{1}{2}} = \frac{1}{\left(25a^8\right)^{\frac{1}{2}}} = \frac{1}{5a^4}$.

a) $\left(9a^4\right)^{-\frac{1}{2}}$ b) $\left(16a^6\right)^{-\frac{1}{2}}$ c) $\left(8a^3\right)^{-\frac{1}{3}}$ d) $\left(\frac{2}{a^3}\right)^{-1}$.