Mental methods (2)

- Knowing mental strategies for adding, subtracting, multiplying and dividing
- Converting between fractions, decimals and percentages
- Knowing mental strategies for solving problems involving fractions, decimals and percentages
- Estimating the square roots of non-square numbers
- Estimating the answer to calculations by rounding

Keywords

You should know

explanation 1a | explanation 1b

1 Work out these sums mentally.

a 55 + 42	**b** 62 + 35	**c** 81 + 16	**d** 143 + 36
e 351 + 28	**f** 475 + 38	**g** 726 + 77	**h** 326 + 685

2 Work out these subtractions mentally.

a 76 − 54	**b** 84 − 21	**c** 97 − 63	**d** 156 − 22
e 572 − 68	**f** 820 − 310	**g** 382 − 165	**h** 246 − 159

3 Work out, in your head, the change given for each item of shopping.

a A pen costing 48p and paid for using a £2.00 coin.

b A rubber costing 37p and paid for using a £1.00 coin.

c A magazine costing £1.70 and paid for using a £5.00 note.

d Some fruit costing £2.68 and paid for using a £5.00 note.

e A cap costing £4.65 and paid for using a £10.00 note.

f A CD costing £9.85 and paid for using a £20.00 note.

g Food costing £38.72 and paid for using a £50.00 note.

explanation 2 online

4 Work out these multiplications mentally.

a 27×0.2 **b** 55×0.3 **c** 72×0.4 **d** 125×0.02

e 320×0.04 **f** 410×0.05 **g** 228×0.02 **h** 820×0.04

5 **a** Serge's moneybox contains thirty-six 20p coins.
How much money, in pounds, is this?

b One biro costs 40p. Calculate the cost, in pounds, of buying sixty biros.

c A sausage machine produces one hundred and twenty sausages each hour. Each sausage is 8 cm long. Calculate the total length, in metres, of sausages produced in 1 hour.

d Beverley's footprint is 15 cm long. If she walks so that her footsteps lie end to end, calculate the total distance, in metres, walked after two hundred and eighty footsteps.

6 Without using a calculator work out these multiplications.

a 13×1.4 **b** 16×1.3 **c** 22×2.1 **d** 44×3.2

e 52×1.8 **f** 61×2.5 **g** 140×1.2 **h** 260×2.4

7 Work these out.

a The total cost, in pounds, of 16 magazines at £1.20 each.

b The total length of 30 cars, each 4.2 m long.

c The total weight of 160 chocolate bars weighing 1.2 kg each.

d The total cost in pounds of 81 sandwiches costing £2.10 each.

explanation 3 online

8 Work these out.

a 23×11 **b** 16×11 **c** 32×12 **d** 45×19

e 65×19 **f** 125×12 **g** 140×18 **h** 123×19

9 Work these out.

a The total number of pupils in 22 classes of 31 pupils each.

b The area of a rectangle 32 cm long and 19 cm wide.

c The area of a square garden with edges of length 29 m.

d The number of chairs in a hall, when there are 29 rows and 15 chairs in each row.

explanation 4a | explanation 4b | online

10 Work these out.

a 930 ÷ 15	**b** 612 ÷ 12	**c** 504 ÷ 18
d 288 ÷ 9	**e** 680 ÷ 20	**f** 1155 ÷ 21
g 784 ÷ 28	**h** 2688 ÷ 24	**i** 2214 ÷ 18
j 2079 ÷ 21	**k** 1550 ÷ 25	**l** 2256 ÷ 16

11 Work these out.

a 810 people are split equally into 15 groups.
How many people are there in each group?

b £8.16 is shared equally amongst 12 children.
How much does each child receive?

c A postman has 360 letters to deliver equally to 45 houses.
How many letters does each house receive?

d 216 kg of flour is shared equally amongst 24 families.
How much flour does each family receive?

12 Work these out.

a 21 ÷ 0.03	**b** 32 ÷ 0.04	**c** 36 ÷ 0.06	**d** 420 ÷ 0.7
e 240 ÷ 0.12	**f** 320 ÷ 0.8	**g** 210 ÷ 0.14	**h** 560 ÷ 0.20

explanation 5a | explanation 5b | explanation 5c | online

13 Copy and complete this table without using a calculator.

Decimal	Fraction	Percentage
0.5	$\frac{1}{2}$	
0.25		
0.333…		
	$\frac{1}{10}$	
		20%
0.666…		
	$\frac{3}{4}$	
	$\frac{1}{8}$	
	$\frac{3}{8}$	
		80%
1.5		150%
1.2		
	$\frac{145}{100}$	
	$\frac{5}{2}$	

14 Work these out.

a 50% of 40 **b** 25% of 80 **c** $\frac{1}{10}$ of 120 **d** $\frac{3}{10}$ of 120

e 0.1 of 70 **f** 0.4 of 70 **g** 60% of 70 **h** $\frac{2}{3}$ of 93

i $\frac{1}{8}$ of 248 **j** $\frac{5}{8}$ of 248 **k** 120% of 50 **l** 160% of 90

m 240% of 60 **n** 175% of 100 **o** 2% of 110 **p** 105% of 6

15 Work these out without using a calculator.

a In a school of 320 pupils, 45% are girls. How many girls are there?

b In a typical family, $\frac{3}{8}$ of income is spent on food. If a family's monthly income is £1200, calculate how much is spent on food.

c In a survey of 450 earthworms, it was found that 36% were over 6 cm in length. How many earthworms in the survey were over 6 cm long?

d Due to high demand, a shop decides to increase the price of one of its games consoles by 11%. If the price was originally £180, calculate the new selling price.

e A book store decides to reduce the price of its books by $\frac{1}{3}$. If a book was originally selling for £24.90, calculate the new sale price.

explanation 6

16 Use estimation to match the value of each square root to a number in the box.

a $\sqrt{5}$ **b** $\sqrt{24}$ **c** $\sqrt{84}$

d $\sqrt{108}$ **e** $\sqrt{77}$ **f** $\sqrt{2}$

g $\sqrt{150}$ **h** $\sqrt{410}$ **i** $\sqrt{34}$

9.2	8.8	4.9
10.4	20.2	5.8
12.2	2.2	1.4

17 Use your answers to question **16** to help you write the approximate length of the side of a square with each area.

a Area = 34 cm^2 **b** Area = 108 cm^2 **c** Area = 5 m^2

explanation 7a explanation 7b online

18 Estimate the answer to each calculation, showing your method clearly.

a 62×39 **b** 71×48 **c** 108×99 **d** 321×148

e $242 \div 62$ **f** $389 \div 47$ **g** $\frac{12 \times 31}{2}$ **h** $\frac{189 \times 211}{8}$

i $8 \times \sqrt{17}$ **j** $\sqrt{52} \times \sqrt{14}$ **k** $\frac{\sqrt{15} \times 89}{4}$ **l** $\frac{\sqrt{125} \times \sqrt{67}}{\sqrt{15}}$

m $23^2 \times \sqrt{6}$ **n** $\frac{31^2}{9 \times \sqrt{105}}$ **o** $19^2 \times 41^2 \times \sqrt{10}$ **p** $\left(\frac{1}{3}\right)^2 \times 385$