Planner

Mental methods

- Using mental strategies to solve problems involving integers
- Using mental strategies to solve problems using fractions, decimal and percentages
- Using powers and roots
- Estimating to check solutions to problems

Keywords

You should know

explanation 1a | explanation 1b | explanation 1c

1 Use complements to work these out.

a 47 + 24 + 53 + 26

b 32 + 89 + 68 + 11

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

d 350 + 125 + 50 + 175

e 0.5 + 1.25 + 4.5 + 3.75

f 243 + 106 + 57 + 214 + 94

2 **a** Jamie picked these cards from a set of decimal cards.

3	0.5	2.5	5	1

Is it possible to make the following totals by adding the numbers on any *four* of his cards?

If so, how?

i 11.5 **ii** 10.5 **iii** 7 **iv** 10 **v** 9

b Jamie picked one extra card from the set of decimal cards and can now make 7.5 using four cards. Which card did he choose?

3 Shona cut a ribbon into four lengths of 65 cm, 1.24 m, 2.35 m and 76 cm.

How long was the ribbon before it was cut up?

4 Find the answers to these by adding or subtracting too much and compensating.

a 8.3 + 2.8 **b** 6.54 − 3.7 **c** 15.63 + 13.89

d 19.36 − 12.94 **e** 203.53 + 37.8 **f** 176.55 − 28.9

g 321.79 + 68.92 **h** 637.68 − 211.96

5 Use partitioning to answer these questions.

a 13.7 + 8.5 **b** 25.56 + 8.33 **c** 23.58 − 0.42

d 54.96 − 15.63 **e** 421.7 + 16.6 **f** 204.47 + 113.13

g 32.6 − 10.75 **h** 236.8 − 114.93

6 Work out each calculation mentally.

The answers are in the circle.

a 1.3 + 6.7 **b** 130 + 260

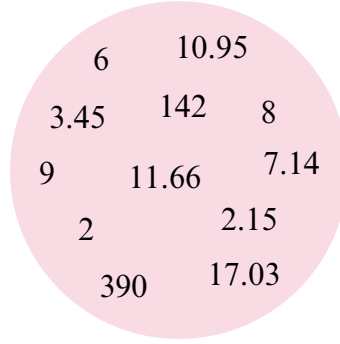
c $\frac{2}{5} + \frac{3}{5} + 5$ **d** 12.45 − 10.3

e 3.64 + 5.36 **f** 7.8 + 3.15

g 321 − 179 **h** 16 − 4.34

i 15.62 − 8.48 **j** $\frac{1}{2} + 1\frac{3}{4} - \frac{1}{4}$

k 4.52 − 1.07 **l** 14.05 + 2.98



7 Find the answers to these using mental strategies.

a 0.67 + 2 + 0.33 + 5.3 **b** 45.8 + 32. 67 **c** 54.36 − 2.09

d 5.87 + 24.65 **e** 4.97 − 1.23 **f** 42.06 − 2.98

g 35.67 − 16.78 **h** 2.17 + 13.83

8 Use the given fact to find the answer to each of these.

a 23 + 15 = 38 Find **i** 2.3 + 1.5 **ii** 0.23 + 0.15

b 1.8 + 3.41 = 5.21 Find **i** 18 + 34.1 **ii** 0.18 + 0.341

c 234 − 1.3 = 232.7 Find **i** 23.4 − 0.13 **ii** 2340 − 13

9 What money would be left after you made each of these purchases?

a A pad of writing paper costing 68p and envelopes costing 54p paid with a £2 coin.

b A bag of groceries costing £27.87 paid with a £50 note.

c A bill of £56.37 for a meal at a restaurant, paid with a debit card with £120 on it.

d A cricket bat for £19.58 and a helmet for £34.99 paid with two £50 notes.

explanation 2a explanation 2b explanation 2c explanation 2d

10 Match each multiplication to a card showing a related calculation.

Use the cards to help you find the answer to each multiplication.

a 56 × 25

b 560 × 250

c 28 × 18

d 2.8 × 18

5.6 × 9

56 × 9

56 × 100 ÷ 4

(56 × 25) × 100

11 Use mental strategies to calculate these.

a 650 ÷ 25	**b** 45 × 14	**c** 125 × 32	**d** 64 ÷ 16
e 41.8 × 25	**f** 24.8 ÷ 4	**g** 20.6 × 23	**h** 648 ÷ 27
i 3.6 × 15	**j** 240 ÷ 16	**k** 1.56 × 70	**l** 8.6 ÷ 4

12 What would these purchases cost?

a 15 packets of biscuits at £1.12 per packet

b 25 jars of jam at £1.25 a jar

c 11 bus tickets costing £2.38 each

d 7 sets of golf balls costing £3.89 a set

13 How much would one of each item cost?

a 16 packs of pasta cost £13.60

b 25 T-shirts cost £321.25

c 15 boxes of paints cost £57.60

d 30 trays of eggs cost £238.50

14 Which of the numbers in the box are divisible by these numbers?

125		1080		216
	2610		234	
200		2400		488

a 5 and 8

b 3 and 6

c 12

15 **a** Use your answers to question **14** to find which of these give terminating decimals when they are divided by 6.

21.6 2.34 48.8 12.5 2.00 2.4 2.610

b What are the answers?

16 Use the given fact to find the answer to each of these.

a $17 \times 31 = 527$ Find **i** 17×3.1 **ii** 1.7×3.1

b $406 \div 29 = 14$ Find **i** $40.6 \div 29$ **ii** $40.6 \div 2.9$

c $13.4 \times 1.6 = 21.44$ Find **i** 13.4×0.16 **ii** 1.34×0.16

d $1566 \div 58 = 27$ Find **i** $15.66 \div 58$ **ii** $156.6 \div 0.58$

17 Find the answers to these using mental strategies.

a 4.8×2.5 **b** 6.5×2.2 **c** 1.68×3.5 **d** 5.08×0.1

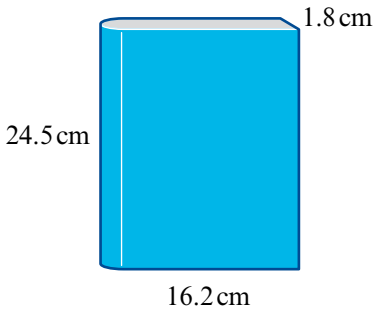
e $13.4 \div 0.5$ **f** $0.98 \div 0.1$ **g** 34.1×0.9 **h** $9.36 \div 0.08$

18 Copy and complete these number chains.

a $2.4 \xrightarrow{\times 6} \square \xrightarrow{\div 3} 4.8 \xrightarrow{\times 0.5} \square \xrightarrow{\div 0.3} \square \xrightarrow{\times 1.4} \square$

b $3.2 \xrightarrow{\div 4} \square \xrightarrow{\times 7} \square \xrightarrow{\div 0.2} \square \xrightarrow{\times 1.2} \square \xrightarrow{\div 0.6} \square$

19 A book is 24.5 cm high by 16.2 cm wide by 1.8 cm thick.



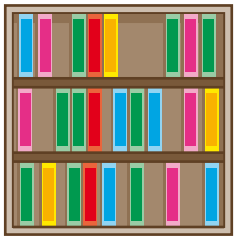
a If 8 books are laid side by side they just fit onto a desk top.
How long is the desk?

b 15 books are stacked on top of each other.
How high is the stack of books?

c A bookcase has two shelves.
Each shelf is 2.5 cm thick.

Three rows of the books fit exactly between the shelves.

What is the minimum inside measurement between the top and bottom of the bookcase?



explanation 3a | explanation 3b | online

20 Copy and complete these tables. Write the fractions in their lowest terms.

Fraction	Decimal	Percentage
$\frac{1}{2}$		
	0.75	
		40%
	0.6	
$\frac{3}{25}$		

Fraction	Decimal	Percentage
		350%
$\frac{5}{8}$		
	0.333...	
		85%
$2\frac{2}{3}$		

21 Find these quantities.

a 25% of 120 **b** 50% of 64 **c** $\frac{3}{4}$ of 80 **d** 0.2 of 30

e 45% of 90 **f** 0.8 of 150 **g** 250% of 48 **h** $\frac{3}{8}$ of 80

i $33\frac{1}{3}$% of 96 **j** 30% of 25 **k** $12\frac{1}{2}$% of 40 **l** 62.5% of 240

22 **a** Increase 500 litres by 40%. **b** Decrease 300 mm by 15%.

c Increase £420 by 30%. **d** Decrease £60 by 4%.

23 Megan had £180 when she went shopping.

A new coat cost 25% of her money. How much did it cost?

24 The probability that Bradley will beat Zac at a computer game is 0.6.

Out of 35 games how many would you expect Bradley to win?

25 When $\frac{2}{3}$ full a car's petrol tank holds 36 litres of fuel.

How much does it hold when full?

explanation 4a explanation 4b online

26 **a** Find the values **i** to **xiii** missing from this table.

x	2	3	4	5	6	7	8	9	10
x^2	4	9	i	25	ii	iii	64	iv	100
$\sqrt{x}$			v					vi	
x^3	8	vii	64	viii	216	ix	x	xi	xii
$\sqrt[3]{x}$							xiii		

b The blocked-out $\sqrt{x}$ and $\sqrt[3]{x}$ cells do not have whole-number square roots or cube roots.

i Is $\sqrt{5}$ closer to 2 or 3?

ii Is $\sqrt{8}$ closer to 2 or 3?

iii Would $\sqrt[3]{5}$ or $\sqrt[3]{10}$ be closer to 2?

27 Find these square roots and cube roots.

a $\sqrt{16}$ **b** $\sqrt{64}$ **c** $\sqrt{36}$ **d** $\sqrt{100}$ **e** $\sqrt{49}$ **f** $\sqrt[3]{125}$ **g** $\sqrt[3]{64}$

28 Find these square roots by writing the number as a product of two square numbers.

a $\sqrt{900}$ **b** $\sqrt{196}$ **c** $\sqrt{324}$ **d** $\sqrt{441}$

Use divisibility rules to help find the factors.

29 Without using a calculator find these squares.

a 15^2 **b** 20^2 **c** 25^2 **d** 30^2 **e** 10^3 **f** 20^3 **g** 30^3

30 Use your answers to question **26** to help estimate these square roots and cube roots.

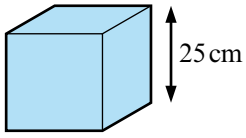
Write each estimate in the form $a < \sqrt{x} < b$.

a $\sqrt{96}$ **b** $\sqrt{69}$ **c** $\sqrt{28}$ **d** $\sqrt{58}$ **e** $\sqrt{39}$ **f** $\sqrt[3]{90}$ **g** $\sqrt[3]{680}$

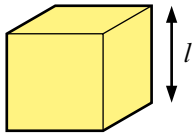
31 **a** What is the area of a square with side 50 cm?

b What is the length of the side of a square with area 1600 cm^2?

32 **a** Find the volume of this cube.



b Find the side length, l, of the cube.



Volume = 125 cm^3

explanation 5a explanation 5b

33 Check these answers using inverse operations. Which ones are wrong?

A 23 × 5 = 120

B 87 ÷ 3 = 29

C 326 − 194 = 134

D 6 × 52 = 312

34 **a** Which of these are equivalent to 24 × 36?

A 12 × 2 × 12 × 3 **B** 48 × 18 **C** 48 × 12 × 2 **D** 24 × 6 × 6

b Find another equivalent calculation that could be used to check the answer.

35 Mutaz accurately measured the heights of his five brothers and sisters.

They were 123.3 cm, 113.4 cm, 108.9 cm, 111 cm and 128.2 cm tall.

Estimate their mean height.

36 Choose the best estimate for these.

a	7.9×1.2	**A** 8×1	**B** 8×2	**C** 7×2
b	3.2×11.3	**A** 4×12	**B** 4×11	**C** 3×11
c	$12.6 \div 5.7$	**A** $12 \div 5$	**B** $12 \div 6$	**C** $13 \div 5$
d	$48.7 \div 7.9$	**A** $48 \div 8$	**B** $49 \div 8$	**C** $50 \div 8$

37 Estimate to find an approximate answer to each calculation.

Do not find the exact answer.

a	4.5×3.8	**b**	$7.8 \div 1.85$	**c**	$128 \div 9.8$	**d**	$96.4 \div 12$
e	8.4×7.8	**f**	346×12	**g**	5.8×9.4	**h**	111×89
i	38.7×9.2	**j**	$523 \div 97$	**k**	489×224	**l**	$317 \div 6.7$

38 Estimate the answer to each of these.

a An ounce is about 28.35 g. How many ounces are there in 585 g?

b A nautical mile is approximately 1.853 km.

How many kilometres are there in 223 nautical miles?

c A litre is approximately 1.759 pints. How many pints are there in 84 litres?

39 On holiday Jo's family travelled 234.7 km on the first day.

On the next four days they travelled, 233.6 km, 87.3 km, 158.2 km and 217.4 km.

a Estimate how far they travelled altogether.

b Find the total distance they travelled.

c The car travels 18 km on 1 litre of petrol.

Approximately how much petrol did they use?