

Primary 3 · Mathematics · Advanced Maths Practice

Mixed problems 3

Time **45 min** Marks **36** Questions **12**

Answers are printed in red after each question, with the working where it matters. Marks in brackets show how a marker would split them.

Section A

Questions 1 to 6 carry 2 marks each.

- 1 Which of the following fractions lies between $\frac{1}{4}$ and $\frac{2}{5}$? [2]

(1) $\frac{1}{5}$

(2) $\frac{1}{6}$

(3) ✓ $\frac{3}{8}$

(4) $\frac{1}{2}$

1. Write both bounds in fortieths: $\frac{1}{4} = 10/40$ and $\frac{2}{5} = 16/40$.
2. $\frac{1}{5} = 8/40$, below the range. $\frac{1}{6}$ is smaller still.
3. $\frac{3}{8} = 15/40$, which sits between 10 and 16.
4. $\frac{1}{2} = 20/40$, which is above $\frac{16}{40}$.

- 2 Look at this number pattern. [2]

240, 265, 295, 330, 370, ...

What number comes next?

(1) 405

(2) 410

(3) ✓ 415

(4) 420

1. The gaps grow by 5 each time: +25, +30, +35, +40, so the next gap is +45.
2. $370 + 45 = 415$.

3 $\blacktriangle \times \blacksquare$ is an odd number, and both $\blacktriangle$ and $\blacksquare$ are whole numbers. [2]

Which of these must work out to an even number?

(1) $\blacktriangle + 6$

(2) $\blacksquare \times \blacksquare$

(3) $\blacksquare - 4$

(4) ✓ $\blacktriangle + \blacktriangle$

1. An odd product means both $\blacktriangle$ and $\blacksquare$ are odd.
2. (1) odd + 6 stays odd.
3. (2) odd $\times$ odd is odd.
4. (3) odd - 4 stays odd.
5. (4) odd + odd is even. Doubling any whole number is even.

4 Flags are fixed along a rope, 3 m apart, with a flag at each end. There are 36 flags in all. How long is the rope? [2]

(1) ✓ 105 m

(2) 108 m

(3) 111 m

(4) 114 m

1. 36 flags make 35 gaps.
2. $35 \times 3 \text{ m} = 105 \text{ m}$.

5 Hana has only \$1 coins and 50-cent coins, and they add up to \$4.50. Which of these cannot be the number of coins she has? [2]

(1) 5

(2) 6

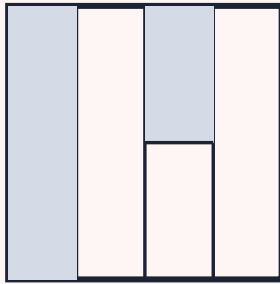
(3) 8

(4) ✓ 9

1. Let there be d dollar coins and h half-dollar coins. $2d + h = 9$ half-dollars, and the coin count is $d + h$.
2. 5 coins: $d + h = 5$ and $2d + h = 9$ gives $d = 4$, $h = 1$. Possible.
3. 6 coins: $d = 3$, $h = 3$. Possible.
4. 8 coins: $d = 1$, $h = 7$. Possible.
5. 9 coins: $d = 0$, $h = 9$. That uses no \$1 coin, so it is not possible if she has both kinds. 9 is the one that cannot be.

The question says she has \$1 coins and 50-cent coins, so both kinds are present. 9 coins would be nine 50-cent coins and no \$1 coin.

- 6 A square is cut into 4 equal strips. Two of the strips are shaded, and one of those shaded strips is then split in half, with only one half kept shaded. What fraction of the whole square is shaded? [2]



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

(2) ✓ $\frac{3}{8}$

(3) $\frac{1}{2}$

(4) $\frac{5}{8}$

1. One full strip is $\frac{1}{4}$ of the square.
2. Half of another strip is $\frac{1}{8}$.
3. $\frac{1}{4} + \frac{1}{8} = \frac{3}{8}$.

ANSWERS AT A GLANCE

1 3	2 3	3 4	4 1	5 4	6 2
-----	-----	-----	-----	-----	-----

Section B

Questions 7 to 12 carry 4 marks each. Show your working.

- 7 What digit does $2 + 4 + 6 + \dots + 80$ end with? [4]

1. This is the even numbers from 2 to 80: 40 numbers.
2. Their sum is $40 \times (2 + 80) \div 2 = 40 \times 41 = 1640$.
3. 1640 ends with 0.

ANSWER 0

- 8** A stall holder needs to sell every cupcake, tart and bun before he covers his costs. [4]
 If he sells all the cupcakes, he is still \$46 short.
 If he sells all the tarts, he is still \$38 short.
 If he sells all the buns, he is still \$24 short.
 How much must he take in altogether to cover his costs?

1. Let C, T and B be the takings from cupcakes, tarts and buns, and let the target be S.
2. $T + B = S - 46$, $C + B = S - 38$, $C + T = S - 24$.
3. Add all three: $2(C + T + B) = 3S - 108$.
4. But $C + T + B = S$, so $2S = 3S - 108$, which gives $S = 108$.

ANSWER \$108

Check: the three 'still short' amounts are 46, 38 and 24, and each item's takings is the target minus the shortfall of the other two. $108 - 46 - 38 = 24$ for the buns, and $24 + 38 + 46 = 108$.

- 9** A and B each stand for a digit from 1 to 9. [4]

$$\frac{A \times A \times A}{2 \times B \times B} = \frac{1}{4}$$

What is the value of $\frac{A}{B}$?

1. Cross-multiply: $4 \times A \times A \times A = 2 \times B \times B$, so $B \times B = 2 \times A \times A \times A$.
2. $B \times B$ is even, so B is even, and it equals twice a cube.
3. Try $A = 2$: $2 \times 8 = 16 = 4 \times 4$, so $B = 4$.
4. $A/B = 2/4 = 1/2$.

ANSWER 1/2

A = 2 and B = 4 is the only pair of digits from 1 to 9 that works.

- 10** A bottle of milk fills 5 mugs equally. If the same bottle is shared equally among 8 mugs instead, each mug gets 90 ml less. How many millilitres of milk are in the bottle? [4]

1. The difference comes from splitting the same milk into more mugs.
2. 5 mugs and 8 mugs: the gap per mug is 90 ml, and the extra 3 shares account for what the first 5 mugs each lose.
3. Each of the 5 mugs loses 90 ml, so $5 \times 90 = 450$ ml is exactly the milk in 3 of the smaller mugs.
4. One smaller mug holds $450 \div 3 = 150$ ml, so the bottle holds $8 \times 150 = 1200$ ml.

ANSWER 1200 ml

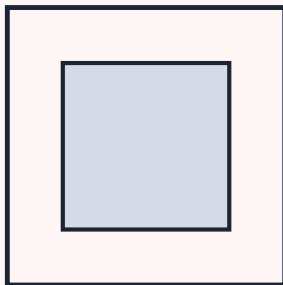
Check: $1200 \div 5 = 240$ ml and $1200 \div 8 = 150$ ml, and $240 - 150 = 90$.

- 11 Priya has 12 strawberries. Arun has 3 kiwis. [4]
Priya gives some strawberries to Arun until she has half as many strawberries as he does.
How many pieces of fruit does Arun have then?

1. There are 12 strawberries in all, and they do not change hands with anyone else.
2. At the end Priya has half of Arun's strawberries, so Priya has 1 part and Arun has 2 parts: 3 parts = 12, so 1 part = 4.
3. Arun has 8 strawberries, plus the 3 kiwis he already had.
4. $8 + 3 = 11$.

ANSWER **11 pieces**

- 12 The diagram shows two squares. The shaded square sits inside the larger one, and the unshaded border has an area of 48 cm^2 . The two squares have side lengths that differ by 4 cm. Find the perimeter of the shaded square. [4]



1. Let the shaded square have side s cm. The outer square has side $s + 4$.
2. $(s + 4)^2 - s^2 = 48$.
3. $s^2 + 8s + 16 - s^2 = 48$, so $8s = 32$ and $s = 4$.
4. Perimeter = $4 \times 4 = 16$ cm.

ANSWER **16 cm**

The border is a frame 2 cm wide on every side, since the sides differ by 4 cm.

Marking notes

- Section A: 2 marks for the correct option. No working is required.
- Section B: 1 mark for a correct first step, 2 marks for the method carried through, 1 mark for the answer with its unit.
- A correct answer in Section B with no working scores 1 mark only.

END OF PAPER