

# I SEE REASONING YEAR 6

Tasks to inspire mathematical thinking

# SAMPLE

True or False?

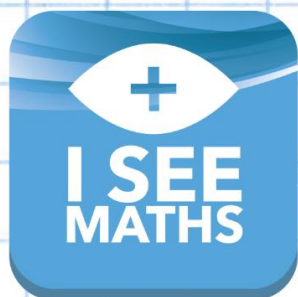
25% of £80 is  
equal to 8% of £25

Halving a negative  
number makes it  
larger because...

2, 9, 16, 23...

Are these numbers in  
the sequence?

37 46 79 140



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Available for digital download

## Different Methods

*What is different about how you answer each question?*

$640 \div 4 = \square$

$640 \div 5 = \square$

$640 \div 64 = \square$

$640 \div 8 = \square$

$640 \div 20 = \square$

## I know... so...

$228 \div 6 = 38$

$228 \div 3 = \square$

$423 \div 3 = 141$

$846 \div 6 = \square$

$413 \div 7 = 59$

$483 \div 7 = \square$

$320 \div 8 = 40$

$304 \div 8 = \square$

$534 \div 6 = 89$

$564 \div 6 = \square$

$213 \div 3 = 71$

$639 \div 3 = \square$

## Small Difference Questions

$480 \div 8 = 60$

$496 \div 8 = \square$

$496 \div 4 = \square$

$536 \div 4 = \square$

$5360 \div 40 = \square$

$258 \div 3 = 86$

$258 \div 6 = \square$

$270 \div 6 = \square$

$210 \div 6 = \square$

$420 \div 3 = \square$

## Estimate

$4143 \div 6$

Whole number answer?

**Yes**    **Possibly**    **No**

$3600 \div 6 = 600 \quad 4200 \div 6 = 700$

Estimate for  $4143 \div 8$

$2868 \div 8$

Whole number answer?

**Yes**    **Possibly**    **No**

$2400 \div 8 = 300 \quad 3200 \div 8 = 400$

Estimate for  $2868 \div 8$

## Explain

For this task, **do not** work out the answers to the questions.

For each question, the answer has **how many digits?**

$576 \div 6$

digit(s)

$5880 \div 7$

digit(s)

$920 \div 8$

digit(s)

$6140 \div 5$

digit(s)

$2076 \div 3$

digit(s)

## Next Step

In each calculation, **what's the remainder?**

$$\begin{array}{r} 18 \quad \square \\ 4 \overline{) 7^3 5^2 8} \end{array}$$

$$\begin{array}{r} 18 \quad \square \\ 4 \overline{) 7^3 2^2 8} \end{array}$$

$$\begin{array}{r} 1264 \\ 6 \overline{) 7^1 5^3 8^2 4} \end{array}$$

$$\begin{array}{r} 07 \quad \square \\ 6 \overline{) 4^4 6^8 8} \end{array}$$

$$\begin{array}{r} 06 \quad \square \\ 6 \overline{) 4^4 1^8 8} \end{array}$$

$$\begin{array}{r} 187 \quad \square \\ 4 \overline{) 7^3 4^2 9^8} \end{array}$$

## Part-Complete Examples

The calculations have been started. **Finish them:**

$$\begin{array}{r} 17 \\ 3 \overline{) 5^2 241} \end{array}$$

$$\begin{array}{r} 17 \\ 3 \overline{) 5^2 271} \end{array}$$

$$\begin{array}{r} 18 \\ 3 \overline{) 5^2 671} \end{array}$$

$$\begin{array}{r} 04 \\ 8 \overline{) 3^3 240} \end{array}$$

$$\begin{array}{r} 04 \\ 8 \overline{) 3^3 440} \end{array}$$

$$\begin{array}{r} 04 \\ 8 \overline{) 3^3 940} \end{array}$$

## Which Answer(s)?

$$738 \div 5$$

**Answer A:**

$$\begin{array}{r} 147r3 \\ 5 \overline{) 7^2 3^3 8} \end{array}$$

**Answer B:**

$$\begin{array}{r} 147\frac{3}{5} \\ 5 \overline{) 7^2 3^3 8} \end{array}$$

**Answer C:**

$$\begin{array}{r} 147.6 \\ 5 \overline{) 7^2 3^3 8.30} \end{array}$$

## Form of Answer

$$\begin{array}{r} 024r2 \\ 8 \overline{) 1^1 9^3 4} \end{array}$$

Question	Answer
194 apples are packed in bags of 8. <b>How many full bags of apples can be packed?</b>	
The restaurant bill for 8 people is £194. <b>How much does each person need to pay?</b>	
An author spends 194 hours writing a book, working over 8 weeks. <b>On average, how long does she work each week?</b>	

## Estimate

$$1272 \div 24$$

Whole number answer?

Yes    Possibly    No

$$1200 \div 24 = 50 \quad 1440 \div 24 = 60$$

Estimate for  $1272 \div 24$

$$2885 \div 16$$

Whole number answer?

Yes    Possibly    No

$$1600 \div 16 = 100 \quad 3200 \div 16 = 200$$

Estimate for  $2885 \div 16$

## Next Step

The calculations are correct. **What are the answers?**

$$483 \div 14$$

$$\begin{array}{r} 14 \overline{) 483} \\ \underline{420} \quad 14 \times 30 \\ 63 \\ \underline{56} \quad 14 \times 4 \\ 7 \end{array}$$

$$764 \div 16$$

$$\begin{array}{r} 16 \overline{) 764} \\ \underline{640} \quad 16 \times 40 \\ 124 \\ \underline{112} \quad 16 \times 7 \\ 12 \end{array}$$

## Next Step

$$420 \div 15$$

**What is the best next step?**

*Explain the mistakes.*

**Next Step A:**

$$\begin{array}{r} 15 \overline{) 420} \\ \underline{150} \quad 15 \times 10 \\ 270 \end{array}$$

**Next Step B:**

$$\begin{array}{r} 15 \overline{) 420} \\ \underline{300} \quad 15 \times 20 \\ 120 \end{array}$$

**Next Step C:**

$$\begin{array}{r} 15 \overline{) 420} \\ \underline{450} \quad 15 \times 30 \\ 30 \end{array}$$

## Next Step

What is the best next step?

$$\begin{array}{r}
 12 \overline{) 298} \\
 \underline{240} \quad 12 \times 20 \\
 58
 \end{array}$$

**Next Step A:**

$$\begin{array}{r}
 12 \overline{) 298} \\
 \underline{240} \quad 12 \times 20 \\
 58 \\
 \underline{36} \quad 12 \times 3 \\
 22
 \end{array}$$

**Next Step B:**

$$\begin{array}{r}
 12 \overline{) 298} \\
 \underline{240} \quad 12 \times 20 \\
 58 \\
 \underline{60} \quad 12 \times 5 \\
 2
 \end{array}$$

**Next Step C:**

$$\begin{array}{r}
 12 \overline{) 298} \\
 \underline{240} \quad 12 \times 20 \\
 58 \\
 \underline{48} \quad 12 \times 4 \\
 10
 \end{array}$$

## Part-Complete Examples

$$\begin{array}{r}
 15 \overline{) 510} \\
 \underline{450} \quad 15 \times 30
 \end{array}$$

$$\begin{array}{r}
 12 \overline{) 558} \\
 \underline{480} \quad 12 \times
 \end{array}$$

$$\begin{array}{r}
 15 \overline{) 875} \\
 \underline{\quad\quad} \quad 15 \times 50
 \end{array}$$

$$\begin{array}{r}
 12 \overline{) 891} \\
 \underline{840} \quad 12 \times
 \end{array}$$

# Explain the Mistakes

$1532 \div 16$

## Mistake A:

$$\begin{array}{r}
 16 \overline{) 1532} \\
 \underline{1440} \quad 16 \times 90 \\
 92 \\
 \underline{96} \quad 16 \times 6 \\
 4 \\
 \text{Answer: } 96 \frac{4}{16}
 \end{array}$$

## Mistake B:

$$\begin{array}{r}
 16 \overline{) 1532} \\
 \underline{1440} \quad 16 \times 90 \\
 112 \\
 \underline{112} \quad 16 \times 7 \\
 0 \\
 \text{Answer: } 97
 \end{array}$$

## Mistake C:

$$\begin{array}{r}
 16 \overline{) 1532} \\
 \underline{1440} \quad 16 \times 90 \\
 92 \\
 \underline{80} \quad 16 \times 5 \\
 12 \\
 \text{Answer: } 107
 \end{array}$$

# Different Methods

$$\begin{array}{r}
 45 \\
 18 \overline{) 810} \\
 \underline{720} \quad 18 \times 40 \\
 90 \\
 \underline{90} \quad 18 \times 5 \\
 0
 \end{array}$$

$810 \div 18$   
 What's the same?  
 What's different?

$$\begin{array}{r}
 45 \\
 18 \overline{) 810} \\
 \underline{72} \downarrow \\
 90 \\
 \underline{90} \\
 0
 \end{array}$$

# Next Step

The workings are correct. **Give the answers.**

$3920 \div 16$

$$\begin{array}{l}
 16 \times 1 = 16 \\
 16 \times 2 = 32 \\
 16 \times 3 = 48 \\
 16 \times 4 = 64 \\
 16 \times 5 = 80
 \end{array}$$

$$\begin{array}{r}
 16 \overline{) 3920} \\
 \underline{32} \downarrow \\
 72 \\
 \underline{64} \downarrow \\
 80 \\
 \underline{80} \\
 0
 \end{array}$$

$828 \div 24$

$$\begin{array}{l}
 24 \times 1 = 24 \\
 24 \times 2 = 48 \\
 24 \times 3 = 72 \\
 24 \times 4 = 96 \\
 24 \times 5 = 120
 \end{array}$$

$$\begin{array}{r}
 24 \overline{) 828.0} \\
 \underline{72} \downarrow \\
 108 \\
 \underline{96} \downarrow \\
 12.0 \\
 \underline{12.0} \\
 0
 \end{array}$$

## Next Step

$$\begin{array}{r}
 3 \\
 15 \overline{) 565} \\
 \underline{45} \phantom{0} \\
 115
 \end{array}$$

What is the best next step?

**Next Step A:**

$$\begin{array}{r}
 36 \\
 15 \overline{) 565} \\
 \underline{45} \phantom{0} \\
 115 \\
 \underline{90} \\
 25
 \end{array}$$

**Next Step B:**

$$\begin{array}{r}
 37 \\
 15 \overline{) 565} \\
 \underline{45} \phantom{0} \\
 115 \\
 \underline{105} \\
 10
 \end{array}$$

**Next Step C:**

$$\begin{array}{r}
 38 \\
 15 \overline{) 565} \\
 \underline{45} \phantom{0} \\
 115 \\
 \underline{120} \\
 5
 \end{array}$$

*Explain the mistakes.*

## Part-Complete Examples

$$\begin{array}{r}
 5 \\
 15 \overline{) 870} \\
 \underline{75} \phantom{0} \\
 \phantom{12}0
 \end{array}$$

$$\begin{array}{r}
 3 \\
 15 \overline{) 565} \\
 \underline{45} \phantom{0} \\
 115
 \end{array}$$

$$\begin{array}{l}
 15 \times 1 = 15 \\
 15 \times 2 = 30 \\
 15 \times 3 = 45 \\
 15 \times 4 = 60 \\
 15 \times 5 = 75 \\
 15 \times 6 = 90 \\
 15 \times 7 = 105 \\
 15 \times 8 = 120 \\
 15 \times 9 = 135 \\
 15 \times 10 = 150
 \end{array}$$

*Which question had more steps? Explain why.*



# Correct or Incorrect?

**Example A:**

$$\begin{array}{r}
 240 \\
 14 \overline{) 3514} \\
 \underline{28} \phantom{0} \phantom{0} \\
 71 \phantom{0} \\
 \underline{70} \phantom{0} \\
 14 \\
 \underline{14} \\
 0
 \end{array}$$

**Example B:**

$$\begin{array}{r}
 342 \\
 14 \overline{) 4788} \\
 \underline{42} \phantom{0} \phantom{0} \\
 58 \phantom{0} \\
 \underline{56} \phantom{0} \\
 28 \\
 \underline{28} \\
 0
 \end{array}$$

**Example C:**

$$\begin{array}{r}
 321 \\
 14 \overline{) 5494} \\
 \underline{42} \phantom{0} \phantom{0} \\
 29 \phantom{0} \\
 \underline{28} \phantom{0} \\
 14 \\
 \underline{14} \\
 0
 \end{array}$$

Explain the mistakes.

## Part-Complete Examples

**2**

$$\begin{array}{r}
 24 \overline{) 5616} \\
 \underline{48} \phantom{0} \\
 81
 \end{array}$$

**3**

$$\begin{array}{r}
 24 \overline{) 9228} \\
 \underline{72} \phantom{0} \\
 202
 \end{array}$$

$$\begin{array}{l}
 24 \times 1 = 24 \\
 24 \times 2 = 48 \\
 24 \times 3 = 72 \\
 24 \times 4 = 96 \\
 24 \times 5 = 120 \\
 24 \times 6 = 144 \\
 24 \times 7 = 168 \\
 24 \times 8 = 192 \\
 24 \times 9 = 216 \\
 24 \times 10 = 240
 \end{array}$$

Which question had more steps? Explain why.

## Rank by Difficulty

$504 \div 24 =$

$504 \div 18 =$

$1818 \div 18 =$

$1200 \div 24 =$

## Broken Calculator

'The 4, 5 and 6 keys on my calculator are broken!'

**How can I use my calculator to work out:**

$1350 \div 15 =$

$624 \div 16 =$

## Small Difference Questions

$384 \div 12 = \square$

$1664 \div 8 = \square$

$384 \div 24 = \square$

$832 \div 4 = \square$

$396 \div 24 = \square$

$832 \div 16 = \square$

$396 \div 12 = \square$

$912 \div 16 = \square$

$336 \div 12 = \square$

$920 \div 16 = \square$

$339 \div 12 = \square$

$920 \div 8 = \square$

**Extend:** Think of two more questions for each sequence.

# I SEE REASONING – Y6

## Answers

### Division, page 2:

**Different Methods:** Possible methods:  $640 \div 4 = 160$  (halve twice)  
 $640 \div 8 = 80$  ( $8 \times 8 \times 10$ )     $640 \div 64 = 10$  (knowledge of place value)  
 $640 \div 5 = 128$  ( $640 \div 10 \times 2$ )     $640 \div 20 = 32$  ( $640 \div 10 \div 2$ )

**I know... so...**  $228 \div 3 = 76$  (double)     $846 \div 6 = 141$  (doubling the dividend and the divisor = same quotient)     $483 \div 7 = 69$  (10 more 7s)  
 $304 \div 8 = 38$  (2 less 8s)     $564 \div 6 = 94$  (5 more 6s)     $639 \div 3 = 213$  (triple)

**Small Difference Questions:** Left column: 62, 124, 134, 134  
 Right column: 43, 45, 35, 140

### Division, page 3:

**Estimate:**  $4143 \div 6$  can't give a whole-number answer (odd  $\div$  even). A reasonable estimate is slightly less than 700 (close to 690).

$2868 \div 8$  numbers ending in 8 are only sometimes multiples of 8. A reasonable estimate will be marginally nearer to 400 than to 300.

**Explain:**  $576 \div 6$ : 2-digits (less than  $100 \times 6$ ).  $6140 \div 5$ : 4-digits (more than  $1000 \times 5$ ).  $5880 \div 7$ : 3-digits (less than  $1000 \times 7$ ).  $2076 \div 3$ : 3-digits (less than  $1000 \times 3$ ).  $920 \div 8$ : 3-digits (more than  $100 \times 8$ ).

**Next Step:** First row: 3 0 1    Second row: 4 5 4

### Division, page 4:

**Part-Complete Examples:** Top row: 1747    1757     $1890 \frac{1}{3}$

Bottom row: 405    430     $492 \frac{1}{2}$  or 492.5

**Which Answer(s):** All answers are correct, although answer A only specifies the remainder, whereas answers B and C show the size of the remainder (answer B as a fraction, answer C as a decimal).

**Form of Answer:** 24 bags of apples    £24.25 each    24 hours 15 minutes

# I SEE REASONING – Y6

## Answers

### Division, page 5:

**Estimate:** It isn't immediately obvious if  $1272 \div 24$  gives a whole-number answer. A reasonable estimate is significantly closer to 50 than 60.  $2885 \div 16$  will not be a whole-number answer (odd  $\div$  even). A reasonable estimate will be significantly nearer to 200 than to 100.

**Next Step:**  $483 \div 14 = 34.5$      $764 \div 16 = 47.75$

**Next Step:** Correct answer is Next Step B. Next Step A takes off too small a chunk (this is not incorrect but it is less efficient). Next Step C takes too large a chunk as  $15 \times 30$  is more than 420.

### Division, page 6:

**Next Step:** Correct answer is Next Step C. Next Step A takes off too small a chunk (this is not incorrect but it is less efficient). Next Step B takes too large a chunk as  $12 \times 5$  is more than 58.

**Part-Complete Examples:**  $510 \div 15 = 34$      $558 \div 12 = 46.5$

$875 \div 15 = 58\frac{1}{3}$      $891 \div 12 = 74.25$

### Division, page 7:

**Explain the Mistakes:** Mistake A: 96 is subtracted from 92, but 96 is more than 92.  $16 \times 5 = 80$  should be used in this position.

Mistake B:  $1532 - 1440 = 92$ , not 112

Mistake C: The remainder is added to the answer rather than being given as the numerator of a fraction with a denominator of 16.

**Different Methods:** Similarities: the same calculations are done at each stage, laid out in the same order. The right-hand method removes the need to understand place value in multiplications.

**Next Step:**  $3920 \div 16 = 245$      $828 \div 24 = 34.5$

### Division, page 8:

**Next Step:** Correct answer is Next Step B. Next Step A takes off too small a chunk (this is not incorrect but it is less efficient). Next Step B takes too large a chunk as  $15 \times 8$  is more than 115.

**Part-Complete Examples:**  $870 \div 15 = 58$      $565 \div 15 = 37\frac{2}{3}$

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## Answers

### Division, page 9:

**Correct or Incorrect?** Example A is incorrect: the calculations are correct but the recording at the top is incorrect:  $5 \times 14 = 70$ ,  $1 \times 14 = 14$ .

Example B is correct.

Example C is incorrect:  $54 - 42 = 12$ , not 2. The number below is 29, it should be 129.

**Part-Complete Examples:**  $5616 \div 24 = 234$      $9228 \div 24 = 384.5$

### Division, page 10:

**Rank by Difficulty:**  $504 \div 24 = 21$ :  $24 \times 20 = 480$ , 24 is a relatively easier number to double (and then multiply by 10). Then one more 24 = 504

$504 \div 18 = 28$ :  $18 \times 20 = 360$ , 18 is a relatively harder number to double (and then multiply by 10). Then eight more 18s = 504

$1818 \div 18 = 101$ :  $18 \times 100 = 1800$ , then one more 18

$1200 \div 24 = 50$ :  $24 \times 100 = 2400$ , so  $24 \times 50 = 1200$

**Broken Calculator:** Example methods:  $2700 \div 30 = 90$

$624 \div 16 = 312 \div 8 = 39$

**Small Difference Questions:** Left column: 32    16    16.5    33    28    28.25

Right column: 208    208    52    57    57.5    115

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