Edexcel GCSE

Mathematics

Foundation Tier

Number: Ratio

Information for students

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 108 questions in this selection.

Advice for students

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

Information for teachers

The questions in this document are taken from the 2009 GCSE Exam Wizard and include questions from examinations set between January 2003 and June 2009 from specifications 1387, 1388, 2540, 2544, 1380 and 2381.

Questions are those tagged as assessing "Ratio" though they might assess other areas of the specification as well. Questions are those tagged as "Foundation" so could have (though not necessarily) appeared on either a Foundation or Intermediate tier paper.

GCSE Mathematics

Formulae: Foundation Tier

You must not write on this formulae page.

Anything you write on this formulae page will gain NO credit.

Area of trapezium $= (a + b)h$
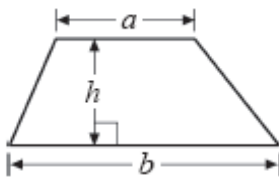
Volume of prism = area of cross section × length
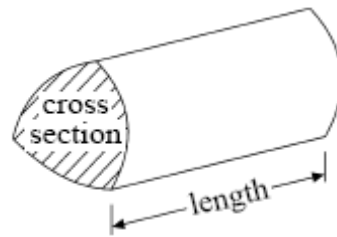
1.   The length of a coach is 15 metres.
      Jonathan makes a model of the coach.
      He uses a scale of 1:24
      Work out the length, in centimetres, of the model coach.

…………………….cm
(Total 2 marks)

2.   The table shows some information about the medals won by each of 6 countries at the 2004
      Olympic Games.

Country	Medals			Total
	Gold	**Silver**	**Bronze**	**Total**
United States	35	39	29	103
Russia	27	27	38	....
Australia	17	16	....	49
Germany	14	16	18	48
Italy	10	11	11	32
Great Britain	9	9	12	30

(a)   Complete the table for Russia and Australia.

(2)

(b)   How many bronze medals did Russia win?

....

(1)

(c)   Which country won 10 gold medals?

....
                                                                                    (1)

Great Britain won a total of 30 medals.

(d)   Work out the fraction of these medals which were silver.
        Give your fraction in its simplest form.

....
                                                                                    (2)

(e)   Find the ratio of the total number of medals won by Germany to the total number of
        medals won by Italy.
        Give your ratio in its simplest form.

....
                                                                                    (2)
                                                                            (Total 8 marks)

3.   Helen has 16 DVDs and 24 videos.

        Write down the ratio of the number of DVDs to the number of videos.
        Give your ratio in its simplest form.

…………………………..
                                                                            (Total 2 marks)

4.   Simplify the ratio 6 : 9

…………………….

(Total 1 mark)

5.   Simplify the ratio   12 : 16

………………

(Total 1 mark)

6.   The only pets a pet shop sells are hamsters and fish.
          The ratio of the number of hamsters to the number of fish is 12 : 28

          (a)   What fraction of these pets are hamsters?
                  Give your fraction in its simplest form.

....

(2)

The only fish the pet shop sells are goldfish and tropical fish.
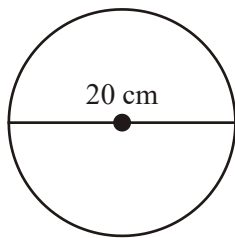The ratio of goldfish to tropical fish is 1 : 4
The shop has 280 fish.

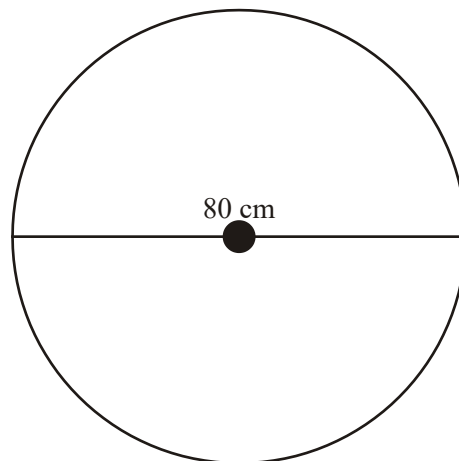(b)   Work out the number of goldfish the shop has.

....
(2)
(Total 4 marks)

7.

Diagrams **NOT**
accurately drawn

20 cm   80 cm

A   B

Circle A has a diameter of 20 cm.
Circle B has a diameter of 80 cm.

Find the ratio of the diameter of circle A to the diameter of circle B.
Give your ratio in its simplest form.

....
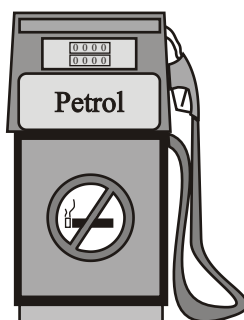**(Total 2 marks)**

8. There are 30 students on a school trip.
12 of the students are girls.
The rest are boys.

Find the ratio of the number of girls to the number of boys.
Give your ratio in its simplest form.

....
(Total 2 marks)

9. The cost of 20 litres of petrol is £18
Work out the cost of 1 litre of petrol.

…………………….
(Total 3 marks)

10.

Picture **NOT** accurately drawn
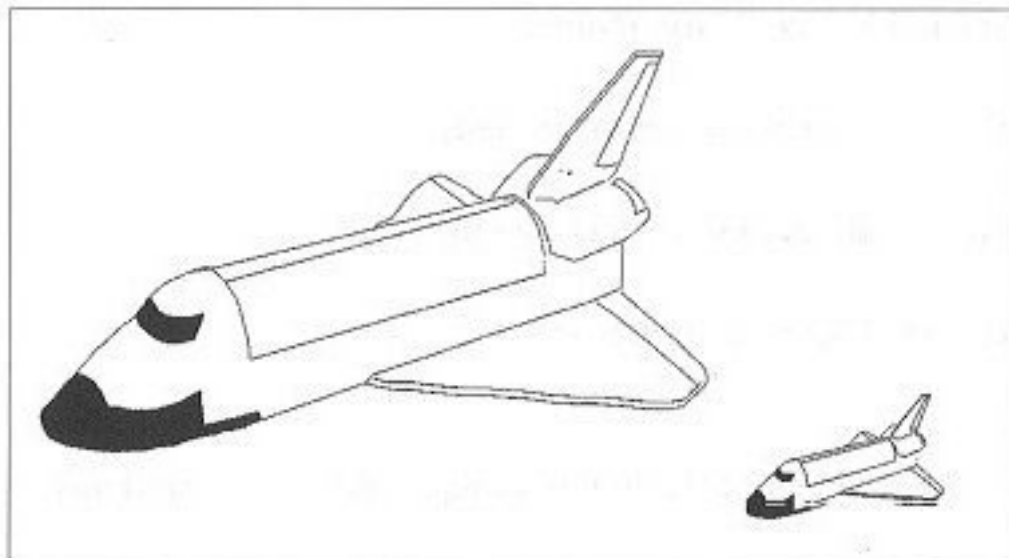
A model of a space shuttle is made to a scale of 2 centimetres to 1 metre.

The height of the model is 10 centimetres.

Work out the height of the space shuttle.
Give your answer in metres.

…………………….m
(Total 2 marks)

11. A box contains 15 red pens and 5 blue pens.

(a) Write the ratio 15 : 5 in its simplest form.

....

(1)

Another box contains green crayons and black crayons.

The ratio of the number of green crayons to the number of black crayons is 5 : 3

(b)   What fraction of the crayons are green?

....
(2)
(Total 3 marks)

12.   A box contains only red pencils and blue pencils.
The ratio of the number of red pencils to the number of blue pencils is 2 : 3

What fraction of the pencils are red?

....
(Total 2 marks)

01.   62.5   2

15 ÷ 24

M1 for 15 ÷ 24 or 1500 ÷ 24 or sight of digits 625
A1 cao

[2]

02.   (a)   92 and 16   2
B1 for 92
B1 for 16

(b)   38   1
B1 cao

    (c)   Italy   1

                     B1 cao

    (d) $\dfrac{9}{30}$ 2

                    $\dfrac{3}{10}$

                     B2 cao

                     (B1 for $\dfrac{9}{30}$ *)*

    (e)   48:32
                  3:2   2

                     B2 cao
                     (B1 for sight of 48, 32 or two numbers in correct proportion)
                     SC B1 for 2:3

                                                                              [8]

03.   2 : 3   2

       16 : 24

                     *M1 for 16 : 24 **OR** 8 : 12 **OR** 4 : 6*

                     A1 [SC B1 for $\dfrac{2}{3}$ *if no method mark earned]*

                                                                              [2]

04.   2 : 3   1

                     B1

                                                                               [1]

05.   3 : 4 or 6 : 8   1

                     B1

                                                                               [1]

06.   3/10   2

$$\frac{12}{12+28}$$

M1 for $\dfrac{12}{12+28}$

A1 cao

[SC: B1 for $\dfrac{3}{7}$ *or* $\dfrac{7}{10}$ *]*

     56   2

     280 ÷ 5

M1 for 280 ÷ 5 or $\dfrac{1}{5}$ *of 280 or 56 seen or 224 seen*

A1 cao

                                                                         [4]

07.   20 : 80
       1 : 4   2

M1 for 20 : 80 o.e. (or $^1/_4$ or 0.25 or 4:1 as answer)
A1 cao

                                                                         [2]

08.   12 : 18
       2 : 3   2

B1 for 12:18
B1ft for correctly simplifying "ratio"

[sc B1 for $\dfrac{12}{18}$ *=* $\dfrac{2}{3}$ *]*

                                                                         [2]

09.   18 ÷ 20 = 0.9
       90p or £0.90   3

M1 for 18 ÷ 20 or valid partitioning method, allow one arithmetic error

A1 for sight of 0.9 or 90 or 0.90
B1 f.t. for their cost of one litre correctly written as money
(SC B1 for £1.11)

                                                                          [3]

10. $10 \div 2$
        5   2

> *M1 for 10 ÷ 2, or multiplication of a scale factor like 1 : "50"*
> *A1 cao*

                                                                                                   [2]

11.   (a) $3 : 1$ 1

> *B1 cao*

     (b) $\dfrac{5}{8}$ 2

> *B2 for 5/8*
>
> *(B1 for a/8 with a < 8 or $\dfrac{5}{b}$ with b > 5)*

                                                                                                   [3]

12. $\dfrac{2}{5}$ 2

> *B2 for $\dfrac{2}{5}$*
>
> *(B1 for $\dfrac{a}{5}$ or $\dfrac{2}{b}$)*

                                                                                                   [2]

01.   **Foundation Tier**

This was one of the least successfully answered questions on the paper with only 4% of candidates gaining any marks. Correct answers were given by 2% of candidates; evidence of correct method was given by another 2% of candidates. Many candidates read "1:24" as meaning a scale factor of 1.24. Others simply converted 15 metres to centimetres and left this as their answer.

Intermediate Tier

Surprisingly, this question was answered very poorly with only one fifth of candidates gaining full marks. The most common error was for 15 to be multiplied by 24, leading to an answer of 360. Some candidates added 1 and 24 together and then divided by 25 as if sharing in a given ratio. Converting the length from metres to centimetres was a problem for some candidates.

02.   The first three parts of this question were answered very well with nearly all candidates gaining at least 3 of the first four marks available. Working out the simplified fraction in part (d) proved more of a challenge. However, about 60% of candidates were awarded at least one mark for giving the fraction in an unsimplified form even if they could not give its simplest form. Responses to part (e) were also good with nearly all candidates using acceptable notation. Where candidates did not give the answer 3:2 it was often through incorrect or incomplete simplification or because they gave 2:3 as their answer.

03.   Most candidates gained at least 1 mark on this question, and usually 2. Errors made centred around incomplete cancelling and, in some cases, writing the ratio as a fraction.

04.   **Paper 8**

Candidates are still unsure of how to approach ratio questions. Many wrote their answer as a fraction, usually $\frac{2}{3}$ or left fractions in their final ratio.

Paper 9

Very well done indeed with all but a few gaining full marks. A few wrote their answer as a fraction ($\frac{2}{3}$) and lost the mark.

05.   Most candidates simplified correctly to gain full marks. An answer of 6 : 8 was also acceptable.

06.   Nearly a quarter of the candidature gained full marks in part (a), however many considered 12/28 to be the required fraction and gained just one mark for a correct simplification to 3/7. In part (b) candidates either chose to divide 280 by 5 or by 4 and so an incorrect answer of 70 was common. A significant number of candidates correctly divided 280 by 5 and then were unsure whether the answer of 56 or 224 was the required answer.

07.   Very few had any notion of ratios with over 80% of the candidates not scoring any marks on this question. The most common answer was 60 where candidates merely subtracted 20 from 80. Some fractions were seen but were rarely cancelled to $\frac{1}{4}$ Around 15% of candidates were able to give a correct ratio and a third of these candidates were able to correctly provide this ratio in its simplest form. Candidates who wrote 20:80 struggled to simplify after 5:20 as they could no longer halve it.

08. Many candidates were able to identify the correct ratio of 12:18 but errors in its simplification either through poor arithmetic or as a result of an incomplete process were not uncommon. The ratio was often reversed and 2:5 (12:30) was a common error. Candidates gained one mark for a ratio correctly simplified.

09. It was disappointing to find that over 60% of the candidates were not able to score even one mark on this question. Candidates were able to score a mark for $18 \div 20$, either done in pounds or pence. A mark was also given to those candidates who were able to put whatever answer they reached, from correct or incorrect methods, into correct money form. Sadly, 0.9p was not an uncommon answer to $18 \div 20$.

10. This was generally well done, most candidates giving a correct answer of 5 metres. A common error was to multiply 10 by 2. Few candidates actually used the scale factor of 50, but of those that did, 500 was a common response with no attempt to change the units.

11. The recognition that 5 is a factor of both 5 and 15 in the ratio 15 : 5 was a clear starting point with the simplified ratio 3 : 1 being produced. Care was needed, however, to retain the colon between the values and it was not uncommon to see it written as 3.1 or 3,1. 46% of the candidates got this part correct.

Converting and interpreting the ratio of 5 : 3 in part (b) to obtain a fraction was dealt with less confidently. The addition of the 3 and the 5 was a crucial first step to achieving the result of 5/8. There were many combinations of 3 and 5 that led to an assortment of fractions. Reward was given for correctly identifying the numerator as 5 and the denominator as 8 as long as the final fraction was less than 1 with 5 % scoring 1 of the 2 available marks and 34% scoring both marks. The most common incorrect response was 53.

12. For many candidates it was too easy to write the answer as 2/3. Only a minority gave the correct answer of 2/5.