5.1 Writing a Ratio as a Fraction or Linear Function: 1-hour Pack

Total Marks

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A ribbon is cut into two pieces so that the length of the first piece to the length of the second piece is in the ratio 2:7.

(a) Write the length of the first piece as a fraction of the length of the second piece. **(1)**

(b) What fraction of the whole ribbon is the second piece? **(1)**

(Total for Question 1 is 2 marks)

---

2 Priya mixes squash and water in the ratio 1:6 (squash : water). Let s be the amount of squash in litres and w the amount of water. Write w as a linear function of s in the form w = ks and give k.

(Total for Question 2 is 4 marks)

---

3 The ratio of concrete to sand in a mixture is 3:11. Write the amount of sand as a fraction of the total amount of mixture.

(Total for Question 3 is 1 mark)

© Revision Library | revisionlibrary.co.uk

4 A recipe uses ingredients in the ratio 5:3:2 for flour:butter:sugar. Work out the fraction of the total mixture that is sugar.

(Total for Question 4 is 2 marks)

---

5 x and y are in the ratio 7:9. Write x as a linear function of y, in the form x = ky.

(Total for Question 5 is 2 marks)

---

6 The ratio of apples to pears is 3:1. Write the number of pears as a fraction of the total. Hence work out how many pears there are when the total is 12.

(Total for Question 6 is 3 marks)

---

7 A chemist uses volumes in the ratio (x + 1):(2x - 5). For which value of x are the two volumes equal? By how much does the first volume exceed the second when x = 8?

(a) Find the value of x for which the two volumes are equal. **(3)**

(b) When x = 8 and the total volume is 660 ml, find how many ml the second volume exceeds the first by. **(4)**

(Total for Question 7 is 7 marks)

© Revision Library | revisionlibrary.co.uk

8 A baker uses flour and sugar in the ratio flour:sugar = 5:2 to make a batch of biscuits.

(a) Write the amount of sugar, S grams, as a linear function of the amount of flour, F grams. **(2)**

(b) The baker has 750 g of flour and wants to use all of it. Calculate how much sugar is needed. **(2)**

.....

(c) The baker only has 180 g of sugar. Work out the maximum amount of flour that can be used while keeping the ratio 5:2. **(2)**

.....

(Total for Question 8 is 6 marks)

---

9 A photographer sets the red and blue light intensities to be $(2x + 1)$ units and $(x - 1)$ units, so the ratio of red to blue is $(2x + 1):(x - 1)$. The total intensity is fixed at 450 units. Given $x > 1$, find x and state the intensities of red and blue light.

(Total for Question 9 is 5 marks)

© Revision Library | revisionlibrary.co.uk

10 Write the function $y = f(x)$ that gives the fraction of the total taken by the first part of the ratio $x : (3x + 4)$. Simplify the function if possible, and state any value of x for which it is not defined.

(Total for Question 10 is 5 marks)

---

11 Two quantities m and n are in the ratio $m:n = 7:4$, so that $m = kn$ for some constant k.

(a) State the value of k. **(1)**

(b) Given also that $m - n = 18$, find the value of n. **(3)**

(Total for Question 11 is 4 marks)

© Revision Library | revisionlibrary.co.uk

12 The ratio of two positive numbers x and y is 2:5. Given that $x + y = 84$, form and solve a linear equation to find the value of y.

(Total for Question 12 is 3 marks)

---

13 A town council divides its budget between parks and libraries in the ratio $5:(t + 3)$. The total budget is 1600 units. The council then changes the split so that the ratio of parks to libraries becomes 3:2, while keeping the total budget at 1600 units and keeping the actual amount allocated to parks exactly the same as before. Find t.

(Total for Question 13 is 8 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 5.1 Writing a Ratio as a Fraction or Linear Function: 1-hour Pack

Question 1

(a) 2/7 oe **B1**

(a) Answer: 2/7

(b) 7/9 oe **B1**

(b) Answer: 7/9

Question 2

uses ratio w/s = 6/1 or writes w = 6s **M1**

w = 6s cao **A1**

states k = 6 **B1**

units or variable consistent (litres) or equivalent statement **B1**

Answer: w = 6s, k = 6

Question 3

11/14 oe **B1**

Answer: 11/14

Question 4

write fraction sugar = 2/(5+3+2) or equivalent method **M1**

2/10 = 1/5 cao **A1**

Answer:1/5 (one fifth). Reason: sugar = 2 out of 10 total, so 2/10 = 1/5, cao.

Working check: 5+3+2=10 so sugar fraction = 2/10 = 1/5.

Question 5

x/7 = y/9 or 7y = 9x oe **M1**

x = 7y/9 oe **A1**

Answer: x = 7y/9

Question 6

1/4 oe **M1**

12 / 4 x 1 oe **M1**

3 cao **A1**

Answer: 3

Question 7

(a) set x+1 = 2x - 5 and form equation **M1**

(a) solve: -x = -6 so x = 6 **M1**

(a) x = 6 cao **A1**

(a) Answer:x = 6.

Working check: x+1 = 2x-5 gives x = 6.

(b) substitute x = 8 to get ratio parts 9 : 11 **M1**

(b) total parts = 20 so part value = 660/20 = 33 **M1**

(b) compute difference second - first = (11 - 9)*33 = 2*33 **M1**

(b) 66 ml cao (second is 11*33 = 363, first is 9*33 = 297, so second exceeds first by 66 ml) **A1**

(b) Answer:66 ml. When x = 8 the ratio is 9:11, total parts 20 so unit = 33 ml. First = 297 ml, second = 363 ml, so the second exceeds the first by 66 ml.

Working check: 660/20 = 33, 9*33 = 297, 11*33 = 363, difference = 66 ml.

Question 8

(a) sets up S/F = 2/5 **M1**

(a) S = 2/5 F oe (accept S = 0.4F) **A1**

(a) Answer: S = 0.4F

(b) substitutes F = 750 into S = 0.4F **M1**

(b) 300 g cao ft **A1**

(b) Answer: 300 g

(c) rearranges to F = 5/2 S (or F = S divide 0.4) and substitutes S = 180 **M1**

(c) 450 g cao ft **A1**

(c) Answer: 450 g

Question 9

form equation using total intensity: (2x+1)+(x-1)=450 **M1**

simplify to 3x = 450 **M1**

solve x = 150 **M1**

x = 150 cao **A1**

red = 2(150)+1 = 301 units, blue = 150-1 = 149 units cao **A1**

Answer:x = 150; red intensity = 301 units; blue intensity = 149 units.

Working check: (2x+1)+(x-1)=3x=450 so x=150. Red=2(150)+1=301, blue=150-1=149. Red+blue=301+149=450, consistent.

Question 10

form fraction x/(x + 3x + 4) = x/(4x+4) **M1**

simplify to x/(4(x+1)) or 1/4 * x/(x+1) **M1**

express as y = (1/4) * x/(x+1) and note not defined at x = -1 (identify domain) **M1**

state simplified expression y = x/(4x+4) cao **A1**

state domain restriction x not equal to -1 and note function form; accept equivalent simplified forms cao **A1**

Answer:y = x/(4x + 4). Simplified form y = x/(4(x + 1)).

Domain: x not equal to -1.

Working check: total = x + (3x+4) = 4x+4 so fraction of x = x/(4x+4).

Question 11

(a) k = 7/4 oe (accept k = 1.75) **B1**

(a) Answer: k = 1.75

(b) substitutes m = 1.75n into m - n = 18 to get 0.75n = 18 oe **M1**

(b) correctly rearranges to find n (dependent on previous M1) **dM1**

(b) n = 24 cao **A1**

(b) Answer: n = 24

Question 12

x = 2k and y = 5k (or equivalent single-variable expressions) **M1**

7k = 84 leading to k = 12 **M1**

y = 60 cao **A1**

Answer: y = 60

© Revision Library | revisionlibrary.co.uk

Question 13

express original parts: parks = 5p, libraries = (t+3)p so total = (t+8)p = 1600	**M1**
after change ratio becomes 3:2 so parks = 3q, libraries = 2q and total =5q =1600 so q = 320	**M1**
parks amount is unchanged: 5p = 3q so p = 3q/5	**M1**
substitute q=320 to get p = 3*320/5 = 192	**M1**
use total (t+8)p =1600 so (t+8)*192 = 1600	**M1**
solve (t+8) = 1600/192 = 25/3? show steps	**M1**
find t = 1600/192 - 8 = (25/3) - 8 = (25 - 24)/3 = 1/3	**M1**
t = 1/3 cao	**A1**

Answer:t = 1/3.

Working check: total 1600 = 5p + (t+3)p = (t+8)p. New ratio 3:2 gives q = 320 and parks 3q = 960 so p = 960/5 = 192. Then t+8 = 1600/192 = 25/3 so t = 25/3 - 8 = 1/3.

© Revision Library | revisionlibrary.co.uk