Additional Assessment Materials
Summer 2021

Pearson Edexcel

GCSE (9-1) in Mathematics 1MA1
Higher (Non-Calculator) (Public release version)

Topic 1: Number and Ratio (Test 4)

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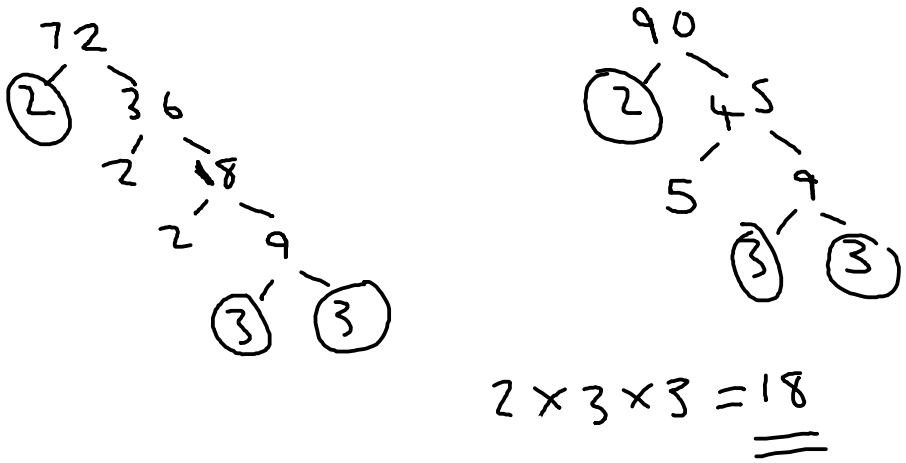
Additional Assessment Materials, Summer 2021

1 Find the highest common factor (HCF) of 72 and 90



$2 \times 3 \times 3 = 18$

18

(Total for Question 1 is 2 marks)

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2 Work out the value of $\dfrac{3^7 \times 3^{-2}}{3^3}$

Indices Laws

$\dfrac{3^7 \times 3^{-2}}{3^3} \rightarrow \dfrac{3^5}{3^3} \rightarrow 3^2 = 9$

9

(Total for Question 2 is 2 marks)

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3 In a village

the number of houses and the number of flats are in the ratio 7 : 4
the number of flats and the number of bungalows are in the ratio 8 : 5

There are 50 bungalows in the village.

How many houses are there in the village?

H : F
7 : 4

F : B
8 : 5

×2

H : F : B
14 : 8 : 5

If 50 Bungalows =

1 part = 10

Houses = 14 parts

$14 \times 10 = 140$

140

(**Total for Question 3 is 3 marks**)

4 A bonus of £2100 is shared by 10 people who work for a company.
40% of the bonus is shared equally between 3 managers.
The rest of the bonus is shared equally between 7 salesmen.

One of the salesmen says,

"If the bonus is shared equally between all 10 people I will get 25% more money."

Is the salesman correct?
You must show how you get your answer.

Scenario A → $2100 \times 0.4 = €840$ shared between 3 managers

$\frac{€840}{3} = €280$ each manager

$2100 - 840 = 1260$ → $\frac{1260}{7} = €180$ each salesman

Scenario B → $\frac{2100}{10} = €210$ each salesman and manager.

$180 \times 1.25 = €225$

$€225 < €210$ Salesman is wrong

(**Total for Question 4 is 5 marks**)

5 Write these numbers in order of size.

Start with the smallest number.

$0.2\dot{4}\dot{6}$ $0.24\dot{6}$ $0.\dot{2}4\dot{6}$ 0.246

0.246 , $0.\dot{2}4\dot{6}$, $0.2\dot{4}\dot{6}$, $0.\dot{2}4\dot{6}$

(Total for Question 5 is 2 marks)

6 A cycle race across America is 3069.25 miles in length.

Juan knows his average speed for his previous races is 15.12 miles per hour.
For the next race across America he will cycle for 8 hours per day.

(*a*) Estimate how many days Juan will take to complete the race.

3069.25 ≈ 3000

15.12 ≈ 15

3000 ÷ 15 = 200 hours

200 ÷ 8 = 25 days

25

(3)

Juan trains for the race.
The average speed he can cycle at increases.
It is now 16.27 miles per hour.

(*b*) How does this affect your answer to part (*a*)?

He can do more miles per hour

So less days taken SO will take him less time to do race

Makes my answer an overestimate.

(1)

(Total for Question 6 is 4 marks)

7 Sean pays £10 for 24 chocolate bars.

He sells all 24 chocolate bars for 50p each.

Work out Sean's percentage profit.

$24 \times £0.50 = €12.00$

$\frac{€12}{€10} = 1.2$

So 20% increase

20 ..... %

(Total for Question 7 is 3 marks)

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8 (*a*) Write 32 460 000 in standard form.

3.246×10^7

(1)

(*b*) Write 4.96×10^{-3} as an ordinary number.

4.96

0.00496

(1)

Asma was asked to compare the following two numbers.

$A = 6.212 \times 10^8$ and $B = 4.73 \times 10^9$

She says,

"6.212 is bigger than 4.73 so *A* is bigger than *B*."

(*c*) Is Asma correct?
You must give a reason for your answer.

Asma is incorrect B is larger

B is $\times 10^9$ whereas A is $\times 10^8$.

(1)

(Total for Question 8 is 3 marks)

9 Work out $3\frac{1}{2} \times 1\frac{3}{5}$

Give your answer as a mixed number in its simplest form.

$3\,1/2 \times 1\,3/5 \rightarrow \frac{7}{2} \times \frac{8}{5} \rightarrow \frac{56}{10} \rightarrow \frac{28}{5} \rightarrow 5\frac{3}{5}$

.....

(Total for Question 9 is 3 marks)

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10 (*a*) Write down the value of $36^{\frac{1}{2}}$

$36^{1/2} \rightarrow \sqrt{36} \rightarrow 6$

± 6

.....

(1)

(*b*) Write down the value of 23^0

$x^0 = 1$

1

.....

(1)

(*c*) Work out the value of $27^{-\frac{2}{3}}$

$27^{-2/3} \rightarrow \frac{1}{27^{2/3}} \rightarrow \frac{1}{(\sqrt[3]{27})^2} \rightarrow \frac{1}{(3)^2} \rightarrow \frac{1}{9}$

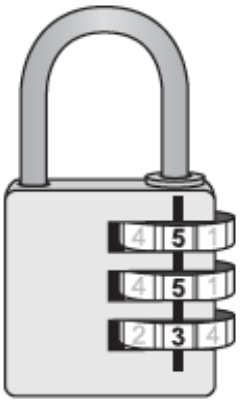
1/9

.....

(2)

(Total for Question 10 is 4 marks)

11 There are three dials on a combination lock.
Each dial can be set to one of the numbers 1, 2, 3, 4, 5
The three digit number 553 is one way the dials can be set, as shown in the diagram.



(*a*) Work out the number of different three digit numbers that can be set for the combination lock.

$5 \times 5 \times 5 = 125$

combination of 3 and 5 options each

so $(5)^3 = 125$

125

(2)

(*b*) How many of the possible three digit numbers have three different digits?

only 5 possibilities of 3 digits in a row

111
222
333
444
555
} = 5

$125 - 5 = 120$

120

(2)

(Total for Question 11 is 4 marks)

12 $x = 0.4\dot{3}\dot{6}$

Prove algebraically that x can be written as $\frac{24}{55}$

Let $x = 0.436\,363\,63\ldots$

$100x = 43.636\,363\,63\ldots$

$-x = \quad 0.436\,363\,63$

$99x = 43.2$

$x = \frac{43.2}{99} \rightarrow \frac{432}{990} \rightarrow \frac{24}{55}$

(Total for Question 12 is 3 marks)

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13 (*a*) Express $\sqrt{3}+\sqrt{12}$ in the form $a\sqrt{3}$ where a is an integer.

$\sqrt{3}+\sqrt{12} \rightarrow \sqrt{3}+\sqrt{3\times4} \rightarrow 1\sqrt{3}+2\sqrt{3} \rightarrow 3\sqrt{3}$

$a=3$

.....$3\sqrt{3}$.....

(2)

(*b*) Express $\left(\frac{1}{\sqrt{3}}\right)^7$ in the form $\frac{\sqrt{b}}{c}$ where b and c are integers.

$\left(\frac{1}{\sqrt{3}}\right)^7 \rightarrow \frac{1}{(\sqrt{3})^7} \rightarrow \frac{1}{27\sqrt{3}} \rightarrow \frac{1}{27\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} \rightarrow \frac{\sqrt{3}}{81}$

$b=3 \quad c=81$

$\frac{\sqrt{3}}{81}$

.....

(3)

(Total for Question 13 is 5 marks)

14 White shapes and black shapes are used in a game.
Some of the shapes are circles.
All the other shapes are squares.

The ratio of the number of white shapes to the number of black shapes is 3:7

The ratio of the number of white circles to the number of white squares is 4:5

The ratio of the number of black circles to the number of black squares is 2:5

Work out what fraction of all the shapes are circles.

W : B
3 : 7

WC : WS
4 : 5

BC : BS
2 : 5

White circles $\frac{3}{10} \times \frac{4}{9} = \frac{12}{90} = \frac{2}{15}$

Black circles $\frac{7}{10} \times \frac{2}{7} = \frac{14}{70} = \frac{1}{5}$

$\frac{2}{15} + \frac{1}{5} = \frac{2}{15} + \frac{3}{15} = \frac{5}{15} = \frac{1}{3}$

1/3

(Total for Question 14 is 4 marks)

15 x is proportional to $\sqrt{y}$ where $y > 0$

y is increased by 44%

Work out the percentage increase in x.

$x \propto \sqrt{y} \rightarrow x = k\sqrt{y}$

$y = 100n^2 \quad x = k\sqrt{(100n^2)} \rightarrow x = 10kn$

$y = 100n^2$ increase by 44% so $\times 1.44 = 144n^2$

$x = k\sqrt{(144n)^2} \rightarrow x = 12kn$

x increased from 10kn to 12kn so 20% increase

$\frac{12-10}{10} \times 100 = 20\%$

.....20.....%

(Total for Question 15 is 3 marks)

TOTAL FOR PAPER IS 50 MARKS