



St. Patrick's High School, Keady
Mathematics Department

GCSE Mathematics Practice Booklet

M8

Topic 1 – Number 1

Binary

Indices

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Questions taken from CCEA Past Papers

Q1 (a) Lucy has a bag containing only 5p and 20p coins.

The ratio of the number of 5p coins to the number of 20p coins is 5 : 4

Work out the ratio of the total value of the 5p coins to the total value of the 20p coins.

Give your answer in its simplest form.

Answer _____ [2]

(b) John and Mark share an amount of money in the ratio 5 : 6

Mark's share is £48

What was the total amount shared?

Answer £ _____ [2]

Q2 The prize money in a golf tournament is divided between the three golfers who finish first, second and third in the ratio 7 : 4 : 3

What **fraction** of the prize money does each of the first three golfers receive?

Write each fraction in its simplest form.

Answer 1st _____ 2nd _____ 3rd _____ [3]

Q3

(a) 60% of entrants pass a test.

What is the ratio of
number who pass : number who fail?

Give your answer in simplest form.

Answer _____ [2]

(b) The ratio of boys : girls born in a hospital one week was 3 : 5

What fraction were girls?

Answer _____ [1]

Q4

(a) Write 25 as a binary number.

Answer _____ [1]

(b) Write the binary number 1101001 in decimal form.

Answer _____ [1]

Q5

(a) Write the binary number 10101 as a decimal number.

Answer _____ [1]

(b) Write the decimal number 26 as a binary number.

Answer _____ [1]

- Q6**
- (a) What is the main difference between the Binary number system and the Decimal number system?

Answer _____ [1]

- (b) Write the binary number 111111 as a decimal number.

Answer _____ [1]

- (c) Write the decimal number 87 as a binary number.

Answer _____ [1]

Q7

110110 is a binary number.

20 is a decimal number.

Work out the total of the two numbers.

Give your answer as a binary number.

Answer _____ [3]

Q8

(a) Write the decimal number 15 as a binary number.

Answer _____ [1]

(b) Write the binary number 1000000 as a decimal number.

Answer _____ [1]

Q9 Without using a calculator evaluate

$$32^{\frac{6}{5}} \div 0.25^{-0.5}$$

Show all your working.

Answer _____ [3]

Q10 Find the value of $(-2)^{-2}$

Answer _____ [2]

Q11

Find the value of

(a) $3^0 + 4^0$

Answer _____ [1]

(b) 2^{-3}

Answer _____ [1]

Q12

Evaluate

(a) $16^{\frac{3}{4}}$

Answer _____ [1]

(b) $\frac{81^{\frac{1}{2}} - 125^{\frac{1}{3}}}{100^{-0.5}}$

Answer _____ [3]

Q13

Simplify

$$\frac{(25)^{-\frac{1}{2}}}{32^{0.2} + 6^0}$$

Answer _____ [3]

Q14

$$\frac{\sqrt{2}}{3^b} = 3 \times (2^a)^3$$

Work out the values of a and b .

Answer $a =$ _____, $b =$ _____ [4]

Q15**(a)** Simplify

(i) $w^3 \times w^2$

Answer _____ [1]

(ii) $\frac{y^6}{y^2}$

Answer _____ [1]

(b) Work out the n^{th} term of the sequence

7, 14, 21, 28, 35 ...

Answer _____ [1]

(c) Work out the value of

(i) 5^{-2}

Answer _____ [1]

(ii) $1^5 + 6^0$

Answer _____ [1]

Q16

x is a number with a value between 0 and 1

From the following list

$$x^{-3} \quad \frac{1}{x} \quad x \quad x^{0.5}$$

(i) which would have the lowest value,

Answer _____ [1]

(ii) which would have the biggest value?

Answer _____ [1]

Q17

$$4^{-\frac{1}{2}} \quad \left(\frac{1}{9}\right)^{-\frac{1}{2}} \quad 64^{\frac{2}{3}} \quad 3^{\frac{3}{2}} \quad 1^{\frac{5}{7}}$$

Prove that one of the above is a prime number and one is a surd.

[3]

Q18

(a) Change 0.527527527... into a fraction.

Answer _____ [2]

(b) Write down the value of $4^{\frac{3}{2}}$

Answer _____ [1]

1. (a) $25 : 80$ MA1
 $5 : 16$ A1
 (b) $48 \div 6 = 8$ MA1
 $11 \times 8 = 88$ A1
-

2. Using 14 A1
 $\frac{1}{2}$ $\frac{2}{7}$ $\frac{3}{14}$ A2
 (A1 for 2 correct **or** $\frac{7}{14}$, $\frac{4}{14}$, $\frac{3}{14}$)
-

3. (a) $60:40$ ans $3:2$ A1 A1
 (b) $\frac{5}{8}$ A1
-

4. (a) 11001 A1

(b) 105 A1

5. (a) 21 A1

(b) 11010 A1

6. (a) Base 2 rather than base 10 or Binary system uses only 2 symbols A1

(b) 63 A1

(c) 1010111 A1

7. 110110 = 54 A1

$54 + 20 = 74$ A1

$74 = 1001010$ A1

8.

(a) 1111

A1

(b) 64

A1

9.

$32^{\frac{6}{5}} = ({}^5\sqrt{32})^6 = 64$

C1

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

C1

$64 \div 2 = 32$

C1

10.

$\frac{1}{(-2)^2}$

M1

$\frac{1}{4}$

A1

11.

(a) 2

A1

(b) 0.125 or $\frac{1}{8}$

A1

12.

(a) 8

A1

(b) $\frac{9-5}{\frac{1}{10}} \left(\frac{4}{\frac{1}{10}} \right)$

M1 A1

$= 40$

A1

13.

$(25)^{-\frac{1}{2}} = \frac{1}{5}$

A1

$32^{0.2} + 6^0 = 2 + 1 = 3$

A1

$\frac{1}{5} \div 3 = \frac{1}{15}$

A1

14.

$b = -1$

A1

$\sqrt{2} = 2^{\frac{1}{2}}$

MA1

$(2^a)^3 = 2^{3a}$

MA1

$a = \frac{1}{6}$

A1

15. (a) (i) w^5 A1
 (ii) y^4 A1
 (b) $7n$ A1
 (c) (i) $\frac{1}{25}$ or 0.04 A1
 (ii) $1 + 1 = 2$ A1
-

16. (i) x A1
 (ii) x^{-3} A1
-

17. $\left(\frac{1}{9}\right)^{-\frac{1}{2}} = 9^{\frac{1}{2}} = 3$ which is a prime number A1
 $3^{\frac{3}{2}} = \sqrt{3^3}$ or $\sqrt{27}$ or $3\sqrt{3}$ which is a surd M1 A1
-

18. (a) $x = 0.527527527\dots$
 $1000x = 527.527527\dots$
 $999x = 527$
 $x = \frac{527}{999}$ M1A1
 (b) 8 A1
-

- Q1** (a) The teacher to pupil ratio in a school is 1:15
There are 960 pupils in the school.
How many teachers are there?

Answer _____ [2]

- (b) 418 of these pupils play football, netball or hockey in the ratio 11:3:8
How many pupils play netball?

Answer _____ [3]

Q2

Andrew, Karan and Caroline share £33.60 in the ratio 5 : 4 : 3

Work out how much money they each receive.

Answer Andrew £ _____

Karan £ _____

Caroline £ _____ [3]

Q3

- (a) In a choir there are 36 female and 24 male singers.

Write down the ratio of female to male singers in its simplest form.

Answer _____ [2]

- (b) There are 52 people in an orchestra.
The ratio of males to females is 3:1
Calculate the number of males and females in the orchestra.

Answer _____ males, _____ females [2]

Q4

(a) Write 25 as a binary number.

Answer _____ [1]

(b) Write the binary number 1101001 in decimal form.

Answer _____ [1]

Q5

Write the binary number 1011001 as a decimal number.

Answer _____ [1]

Q6 (a) Write the decimal number 19 as a binary number.

Answer _____ [1]

(b) Rearrange $h - 3m = y$ to make m the subject.

Answer _____ [2]

Q7

The angles in a quadrilateral are 120° , A° , B° and C° .

The angles A, B and C are in ratio 3 : 5 : 4

Calculate the size of the angle B.

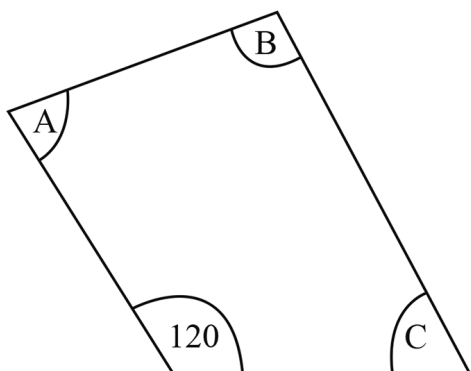


Diagram not drawn
to scale

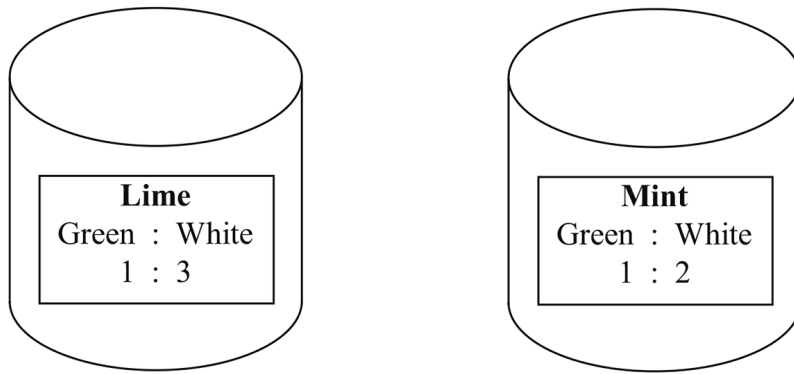
Answer Angle B = _____ $^\circ$ [3]

Q8 Jane works in a jewellery shop and earns £7.75 per hour.
She works eight hours a day.
For each Gem product she sells, Jane receives a bonus of £5.25
The manager noted that in the previous 40 working days Jane sold 5 Gem products.

Jane asks for advance payment of her next month's wages. The manager agrees. There are 24 working days in the next month. Calculate the amount the manager should pay her in advance, taking account of her previous performance.

Answer £ _____ [4]

Q9 Green and white paint can be mixed in different ratios to make different shades.



Janet has 1.2 litres of Lime. How much extra green paint does she need to add to turn it into Mint?

Answer _____ [4]

1. (a) $960 \div 15 = 64$ M1 A1
- (b) $418 \div 22$ M1
19 A1
 $3 \times 19 = 57$ MA1
-

2. 14.00 A1
11.20 A1
8.40 A1
-

3. (a) $36 : 24 \quad 3 : 2$ A1 A1
- (b) 39, 13 A1 A1
-

4. (a) 11001 A1
- (b) 105 A1
-

5.

64	32	16	8	4	2	1
1	0	1	1	0	0	1

$$= 64 + 16 + 8 + 1$$

$$= 89 \text{ (correct answer, with no work shown, gains mark)}$$

MA1

6.

(a) 10011

A1

(b) $h - y = 3m$

MA1

$$m = \frac{h - y}{3}$$

A1

7.

$$360 - 120 = 240$$

MA1

$$240 \div 12 = 20$$

MA1

$$20 \times 5 = 100$$

MA1

8.

$$7.75 \times 8 \times 24 = 1488$$

MA1

$$\frac{5}{40} = \frac{1}{8} \text{ Gem}$$

$$\frac{1}{8} \text{ of } 24 = 3$$

MA1

$$1488 + 3 \times 5.25$$

M1

$$1503.75$$

A1

9.

$$\frac{1200}{4} = 300$$

or $\frac{1.2}{4} = 0.3$

$$\text{Lime} = 300 : 900$$

$$\text{Lime} = 0.3 : 0.9$$

MA1

$$\text{Mint} = 1 : 2 = 450 : 900$$

$$\text{Mint} = 1 : 2 = 0.45 : 0.9$$

MA1

Extra 150 ml (0.15 litres)

Extra 0.15 litres (150 ml)

A1, A1 (units)
