

# GCSE Mathematics

## Practice Questions For the non Calc Foundation paper

Version 4 January 2019

Name-

Set-

	Skills Covered	Clip No	Grade	Can Do
1	Order of operation	75	3	
2	Ordering integers and decimals	2/3	1	
3	Substituting values into algebraic expressions	95	2/3	
4	Comparing fractions	70	3	
5	Correlation (scatter diagrams)	129	3	
6	Simultaneous equations	162	5	
7	Algebraic expressions	137	3/4	
8	Algebraic expressions (indices)	29/82	2/3	
9	Converting between ratio and fractions	107	3	
10	Square numbers	81	3	
11	Substituting values into an algebraic expression	95	2/3	
12	Factorise	94,157	3-5	
13	Standard form to normal form	83	3	
14	Units (speed)	142	3/4	
15	Division and multiplying decimals	66/67	3	
16	Standard form	83	3	
17	Ratio	38/106	2/3	
18	Congruency	12b	1	
19a	Biased	125	3	
19 b-d	Definitions for data (primary ,secondary etc.	63	2	
20	Converting fractions to percentages	85	3	
21	Converting units with in the same system cm to mm	112	3	
22	Time	6a/b	1	
23	Solving simple linear equations (involving decimals & fraction)	135a/b	3/4	
24	Fraction of amounts	72	3	
25	Substituting values	95	3	
26	Rearranging formula	136	4	
27	Multiplying fractions	73	3	
28	Substituting values	95	3	
29	Estimating	91	3	
30	Negative numbers	68a/b	3	
31	Units volume	115	3	
32	Factorise	94	3	
33	Inequalities	138	4	
34	Percentage increase and decrease	108	3	
35	Simplify (expand brackets)	134a/b	3/4	
36	Solve equations (including quadratic when they equal zero)	135a/b	3/4	
37	Product of prime factors	78	3	
38	Equation of a straight line	159a/b	5	
39	Area of circle	117	3	
40	Circumference of a circle	118	3	
41	Ratio (scale)	38/106	2/3	
42	Highest common factor (HCF)	79	3	
43	Lowest common multiple (LCM)	80	3	
44	Vertices and edges (properties of solids)	43	2	
45	identities	137	4	
46	Mid-point of two co-ordinates	133	4	
47a	Upper and lower bounds	132	4	
47b	Error interval	155	5	
48	Product (multiply)	19	2	

49	Sum (Add)	17	2	
50	Estimation	91	3	
51	Indices (sorting into order of size)	29/82	2/3	
52	Nth term	102/103	3	
53	Fractions- addition, multiplication & division	71/73/74	3	
54	Division (with and without a decimal)	35	2	
55	Percentage of amounts	87	3	
56	Factorise	94157	3-5	
57	Simplify expressions	33/34/134	2-4	
58	Rules of indices	29/82	2/3	
59	Simultaneous equations	162	5	
60	Powers	29/30	2	
61	Cube root	81	3	
62	Fractions	71	3	
63	Angles in a triangle	121	3	
64	Definitions of parts of a circle	116	3	
65	Ratio	106	3	
66	Sample space	152	3/4	
67	Reflection, translation and rotation	48/49/50	2	
68	Mode and range	62	2	
69	Fractions multiply and dividing mixed numbers	73/74	3	
70	Venn diagrams	127	3	
71	Tree diagrams	151	4	
72	Area and perimeter, algebraic expressions	137	4	
73	Construction, perpendicular bisector	146	4	
74	Multiplying decimals	66	3	
75	Division	20	2	
76	Simplifying algebraic expressions	33	2	
77	Calculations involving powers	30	2	
78	Fibonacci sequence	141	4	
79	Sequence, nth term	102	3	
80	Simple interest	111	3	
81	Tessellation	129	3	
82	Shapes, number of sides	10	1	
83	External angles	120	3	
84	Ratio	38/106	2/3	
85	Solving inequalities	139	4	
86	Median and mean of discrete data	62	2	
87	Conversion fractions, decimals & percentages	85	3	
88	Calculations involving dates on a calendar		2	
89	Reciprocals	76	3	
90	Plotting straight lines	96	3	
91	Ratio	106	3	
92	Ration in the form n:1		3	
93	Factors	28	2	
94	Solving linear equations	135	4	
95	Factorise	94/157	3-5	
96	Exact Trig values	173	5	
97	Area of sector in terms of pi	167	5	
98	Fractions of amounts	71	3	
99	Probability scale	14	1	
100	Division and multiplication problems	35	3	
101	Working with money, adding decimal numbers	22a	2	
102	Reasoning	156	5	
103	Questionaries'		2/3	
104	Pie charts	128a	3	
105	Rotational symmetry	49	2	
106	Construct a line of symmetry	146	4	
107	Volume of a cuboid	115	3	

1. Work out    a)  $4 + 3 \times 5 =$                       b)  $8 + 2(4+1)^2 =$                       c)  $26.5 - 1.5 \times 4 =$

2. Write these numbers in order starting with the smallest.

a) -1, 11, 0, -9, 8, -12

b) 7.213, 7.05, 7.12, 7.1, 7.008, 6.58

3. Here is a formula.

$$V = \frac{1}{3} \times X^2 h \quad \text{find the volume 'V' if } X = 2 \text{ cm and } H = 6 \text{ cm}$$

4. Which of  $\frac{3}{10}$  and  $\frac{1}{8}$  is closer to  $\frac{1}{4}$

5. Draw a sketch of Negative correlation



6.  $2x + 4y = 16$

$3x + 4y = 24$

Work out the values of x and y.

7. Which of these can be written as  $\frac{d}{c}$

$d \div c$        $c - d$        $c \div d$        $d - c$

8. Circle the expression that can be written as  $4Y^2$

$(4Y)^2$        $4 \times Y \times Y$        $4 \times Y$        $4 \times 2 \times Y \times Y$

9. A bag contains red counters and blue counters in the ratio 6 : 5

What fraction of the counters are blue ? Circle your answer

$\frac{1}{5}$        $\frac{6}{11}$        $\frac{5}{6}$        $\frac{5}{11}$

10 The sum of two square numbers is 89

What are the **two** square numbers?

11. Work out the value of  $2(4x - 3y)$  when  $x = 5$  and  $y = -2$

12 Factorise

a)  $15x + 25y - 30z$

b)  $7yx^2 - 14yx$

c)  $x^2 + 9x + 20$

d)  $x^2 + x - 20$

e)  $x^2 - 36$

13. Which of these has the greatest answer circle your answer

$0.65 \times 10^2$

605

$6.5 \times 10^2$

$650 \times 10^{-2}$

14. Which unit is **not** a unit of speed? Circle your answer.

Miles/hour,

metres/second,

cm

km/hour

15. 8 rulers cost £2.40 How much do 7 rulers cost?

16. Circle the number written in standard form.

$0.5 \times 10^{-3}$

$5 \times 10^{-2}$

$50 \times 10^3$

$5 \times 10^{0.3}$

17. There are between 30 and 40 students in a class. The ratio of boys to girls is 7 : 6

a) How many students are in the class?

b) How many boys are in the class?

18. If two triangles are congruent what does this mean?

19. a) what does biased mean regarding flipping a coin b) what is continuous data?

c) What is primary data?

d) what is secondary data?

20a) what is  $\frac{9}{10}$  written as a percentage. b) what is  $1\frac{3}{20}$  written as a percentage

21 Convert a) 4.3 m to cm

b) 71 mm to cm

c) 5900 cm to metres

22 The first part of a show starts at 6:39 pm It lasts 2 hours & 35 minutes. What time does it finish

23 Solve a)  $0.2y = 8$

b)  $x/5 = 3$

24 What fraction of  $1\frac{1}{3}$  is  $\frac{1}{6}$ ?

25 A point lies on the graph with equation  $y = x^2 + 2x$

The  $x$ -coordinate of the point is  $-3$  Circle the

coordinates of the point.

26 Rearrange  $a = b - 3$  to make  $b$  the subject.  $(-3, -3)$   $(-3, 3)$   $(-3, 0)$   $(-3, 15)$

27. Work out a)  $\frac{1}{5} \times \frac{4}{7} =$  b)  $\frac{2}{5} \times 7 =$  c) find  $\frac{4}{9}$  of 27 =

Give your answer as a mixed number where required

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28 A shopkeeper uses this formula to work out the cost of bags of oranges.

$$C = 2.4n$$

$C$  is the cost in £

$n$  is the number of bags

Work out the cost of 9 bags

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29. By rounding each number to 1 significant figure, estimate the answer to

$$\frac{81 \times 58.5}{113} =$$

You **must** show your working.

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30. a) Add -8 and -3 b) what is 5 less than -1 c) What is 3 more than -6

31. Circle the unit of volume

millimeter's

grams

litres

degrees

32. Factorise a)  $12x + 8y$

b)  $12x - 4$

c)  $10x^2 + 8x$

33. a) Write down the integer values of  $x$  where  $-2 \leq x < 6$

b) Sketch  $-2 \leq x < 6$  on a number line

34. a) Increase 400 by 26%

b) decrease 300 by 5%

c) What single value and operation can be used to increase any amount by 7% (multiplier)

35. Expand and simplify a)  $5(x + 3) - 2(x - 4)$  b)  $(x + 6)(x - 3)$  c)  $(x - 7)^2$

36. Solve a)  $4x - 2 = 18$

b)  $2(x - 4) = 3x + 2$

c)  $(x - 2)(x + 6) = 0$

37. Write a) 24 and b) 240 as a product of their prime factors.

38.  $Y = -3x - 1$

a) What is the gradient

b) What is the point of intercept?

39. What is the formula for the area of a circle?

40. What is the formula for the circumference of a circle?

41. Circle the ratio which is the same as the scale 1 mm represents 2 m

1 : 2

1 : 20

1 : 200

1 : 2000

42. Work out the highest common factor (HCF) of 40 and 24

43. Work out the lowest common multiple (LCM) of 6 and 8

44a) How many vertices has a triangular prism?

44b) How many edges has a triangular based pyramid?

45. Circle the identity

$$\begin{array}{cc} (x-3)^2 & (x-3)^2 > 6 \\ (x-3)^2 = 1-3x & (x-3)^2 \equiv x^2 - 6x + 9 \end{array}$$

46. Find the mid-point of the straight line with coordinates (1, 2) and (-3, 7)

47a) What is the upper and lower bound if the length of a piece of wood is rounded to 13.6 m

47 b) What is the error interval for question 47a)  $\leq X <$

48. What is the product of 7 and 3 ?

49a. What is the sum of 8 and 5 ?

49b The product of two consecutive numbers is 30 what are the two numbers?

50 Estimate an answer to the following  $\frac{187.3 \times 19.2}{0.51}$

51. Sort the following smallest to largest

$$4^{-1}, 4^1, 4^0, 4^2, \sqrt{4}, 4.1, 46\%$$

52. Find the nth term for

a) 2, 6, 10, 14

b). 7, 12, 17, 22

c) Would the number 75 be in the series generated from  $4n + 3$

53. Calculate a)  $\frac{1}{3} + \frac{4}{7}$

b)  $\frac{3}{7}$  of 35

c)  $\frac{4}{5} \div \frac{3}{7}$

54. Without a calculator work out a)  $296 \div 4$

b)  $296 \div 0.4$

c)  $624 \div 12$

55. For £240 find a) 5%

b) 26%

56. Factorise a)  $8Y + 6$

b)  $8Y^2 + 6Y$

c)  $t^2 + 7t + 6$

57. Simplify a)  $Y+Y+Y+ Y +Y +Y -Y$

b)  $5(3x-6) - 3(x- 2)$

58. Simplify a)  $Y^3 \times Y \times Y^4$

b)  $Y^8 \div Y^5$

c)  $4Y^5 \times 3Y^2$

d)  $16Y^7 \div 2Y^2$

e)  $(4X^5)^2$

59. 4 cakes and 3 doughnuts cost £11, 4 cakes and 7 doughnuts cost £23.  
Work out the cost of one cake and one doughnut separately

60. a) Find  $2^5 =$

61. Find  $\sqrt[3]{8} =$

62. Sapir buys 60 bags.

She pays £3 for each bag.

Sapir sells  $\frac{2}{3}$  of the bags for £5 each.

She sells  $\frac{1}{3}$  of the bags for £4 each.

Sapir wants to make a total profit of £75

How much should she sell each of the remaining bags for?



63. Finding angles in a triangle

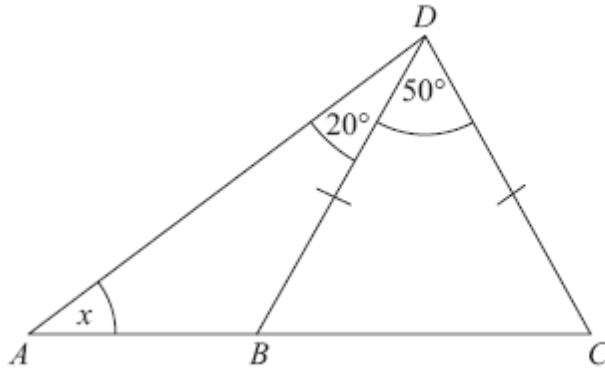


Diagram **NOT**  
accurately drawn

$ABC$  is a straight line.

$BD = CD$ .

Angle  $BDC = 50^\circ$ .

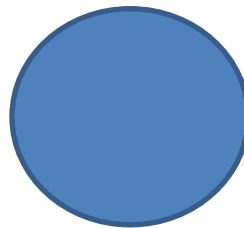
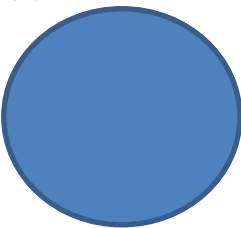
Angle  $ADB = 20^\circ$ .

Work out the size of the angle marked  $x$ .

Give reasons for your answer.

64. Name all the parts of a circle

(a) Label the two circles using radius, diameter, chord, circumference, tangent, sector and segment



65. Ratio (a) Divide £490 into the ratio 2:5

(b) Divide £320 into the ratio 4:3:1

66. Sample space diagrams

- (a) A coin is flipped and a dice rolled. If the coin lands on a head the score is recorded. If a tail is flipped then the score from the dice is trebled.

Complete the sample space diagram

	1	2	3	4	5	6
Head				4		
Tail			9			

- (b) What is the probability of getting a score below 5?

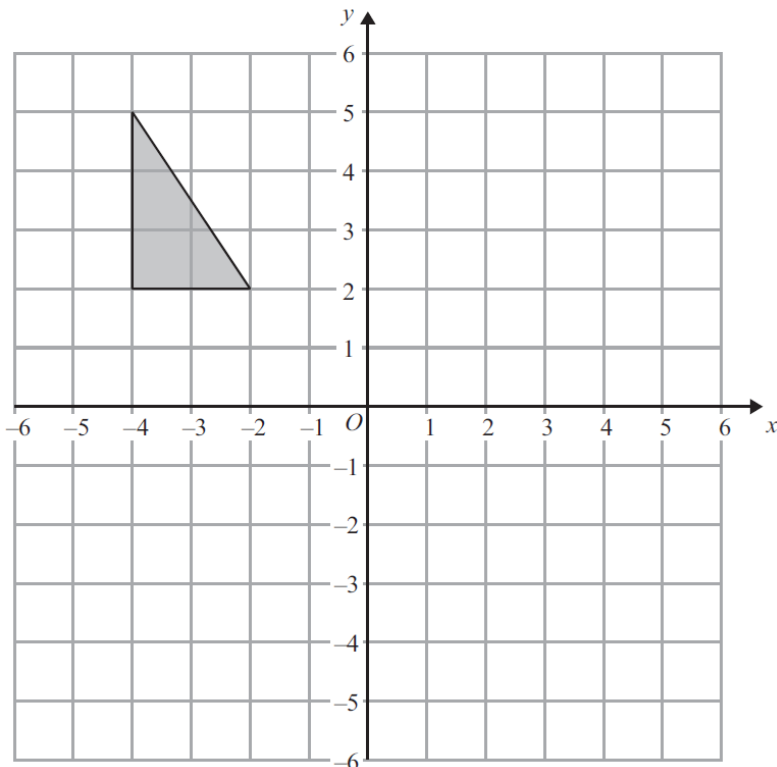
67. Reflect, translate and rotate shapes

Reflect the shape about the y axis ( $x=0$ ) and label it 'A'

Translate the original shape -1 and label it 'B'

-5

Rotate the shape 180 CW about the point (0, 0) and label it 'C'



68. Finding averages probability scale



There is a whole number from 0 to 9 on each card (including the hidden number).  
The number on the last card is hidden.

- (a) If the mode of the five numbers is 3 what would the number be on the hidden card
- (b) If the range of the five numbers is 5 what would the number be on the hidden card

## Fractions with mixed numbers

69.

a)  $1\frac{1}{2} \times \frac{1}{3}$

b)  $\frac{2}{3} \times 2\frac{2}{5}$

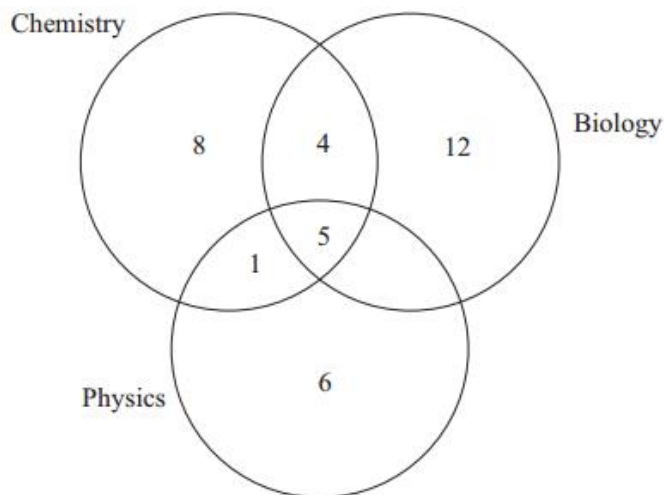
a)  $1\frac{1}{3} \div \frac{1}{4}$

b)  $\frac{3}{5} \div 2\frac{2}{3}$

## Venn diagrams

70.

The Venn diagram shows the number of students studying one or more of the sciences Chemistry, Biology and Physics.



- a) How many students are represented in this Venn diagram?
- b) How many students are studying exactly two sciences?
- c) What is the probability that a student chosen at random is not studying Physics?

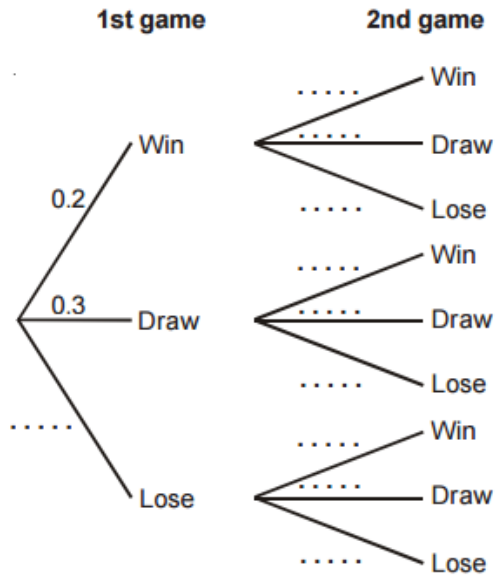
d)  $(C \cap B)$

**Tree diagrams**

71.

In a game of chess, a player can either win, lose or draw.  
 The probability that Jane wins any game of chess is 0.2  
 The probability that Jane draws any game of chess is 0.3  
 Jane plays 2 games of chess.

a) Complete the probability tree diagram.



b) Work out the probability that Jane will win both games.

72. Find areas and perimeters using Algebra

The diagram shows a garden in the shape of a rectangle.

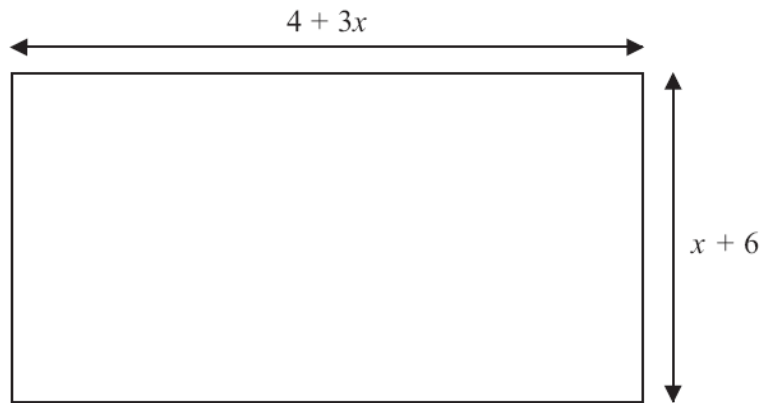


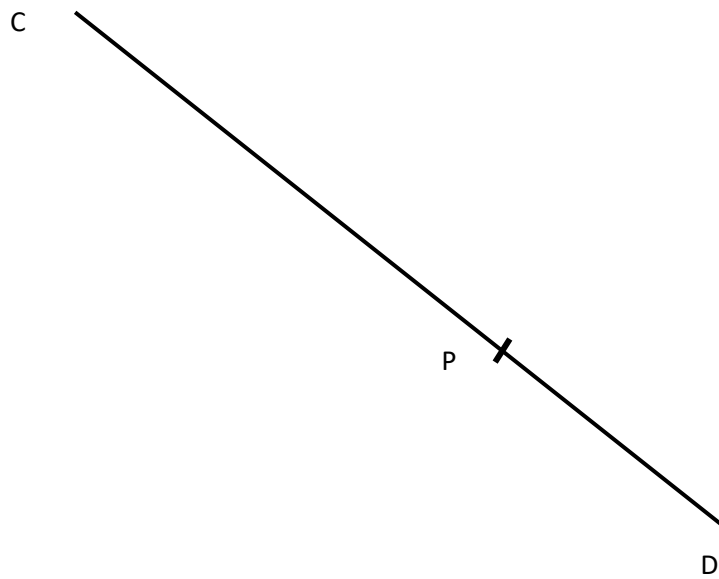
Diagram **NOT** accurately drawn

All measurements are in metres.

(a) The perimeter of the garden is 60 metres. Work out the value of  $x$ .

(b) Find an expression for the area of the garden

73. Use a ruler a compass to Construct the perpendicular bisector to the line segment CD, that passes through the point P. You must show all c



74. Multiply  $5.14 \times 1.8 =$

75.  $682 \div 11 =$

76. Simplify  $A + A + A + A + A + A + B \times B$

77. Calculate a)  $9^0 =$  b)  $2^3 + 4^2 =$  c)  $\sqrt{4^2}$

78. For the Fibonacci sequence write the next two terms

1, 2, 3, 5, 8, .....?

79. Is 46 a number in the sequence generated by  $5n + 1$  ?

80. What is the Simple Interest on £2000 at 5% for 3 years?

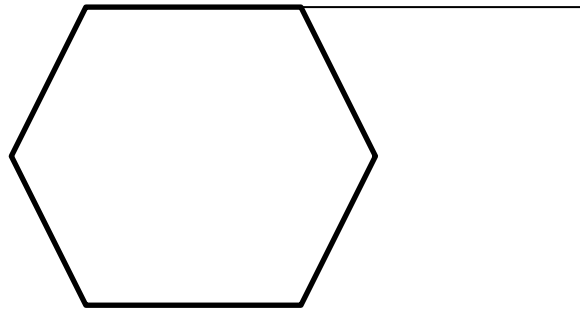
81. Tessellate this shape 5 times.



82. From the list below circle the shape that has got the most sides:

Pentagon, Trapezium, Rhombus, Heptagon, Kite, Hexagon

83. Find the external angle of the shape below



84. Ant and Dec have their money divided into the ratio of 2:7

If the difference in their pay is £500

How much do they both get?

85. Solve the inequality

a)  $7x + 2 > 23$

b)  $2y - 3 < 7 + 4y$

86. For the following numbers find

A) Median

B) Mean

5, 4, 8, 3

87. Complete the table to show equivalent fractions, percentages and decimals

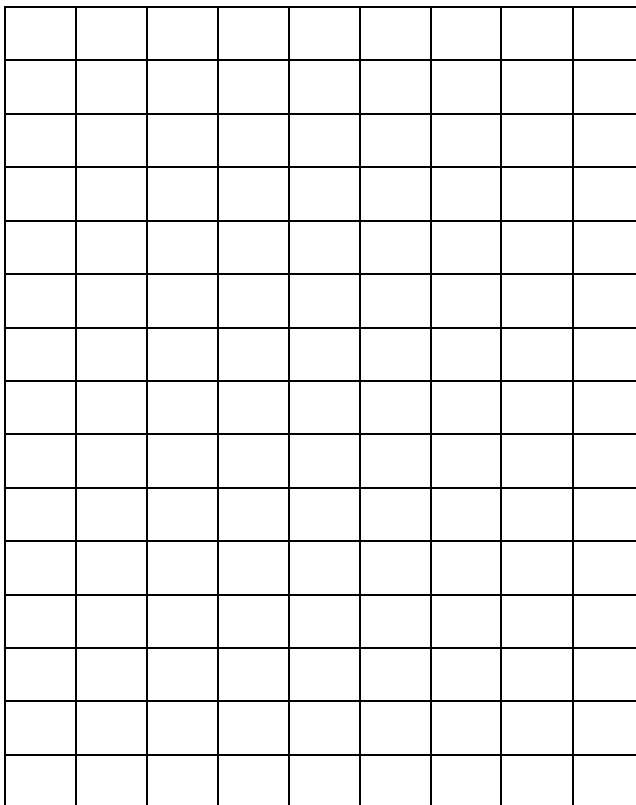
Fraction	Decimal	Percentage
$9/2$		
		160%
	0.66	
$3/4$		
$7/10$		
	0.51	
$1/3$		
	0.4	
		25%
$1/10$		
	0.2	
		0.3%

88. A library book was due to be returned on 24 April. It was actually returned on the 8 May. There is a fine for every day the book is late of 10 p per day. Work out the total fine?

89. Complete the grid so that when you multiply the three numbers in any row they equal 1 (remember any number multiply by its reciprocal also equals 1)

<b>12</b>		<b>1/3</b>
	<b>1/5</b>	<b>15</b>
<b>1/2</b>	<b>10</b>	
<b>5</b>	<b>2</b>	

90. On the grid, draw the graph  $y + 2x = 2$  for the values of  $x$  from -2 to 3



91.  $x : y = 5 : 3$

$$x + y = 40$$

Work out the value of  $2x - y =$

92. a) Write the ratio  $7 : 4$  in the form  $n : 1$

b) Write the ratio  $8 : 3$  in the form  $1 : n$

93.

Which of these numbers has exactly two factors?  
Circle your answer.

8,                      13,                      10,                      15,                      9

94. Solve the equations

a)  $X - 4 = 12$

b)  $4X = 16$

c)  $3X - 1 = 14$

d)  $0.2X + 1 = 5$

e)  $X/4 + 2 = 8$

f)  $5(X + 2) = 4X - 5$

95. Factorise

a)  $15P + 10$

b)  $15P^2 + 10P$

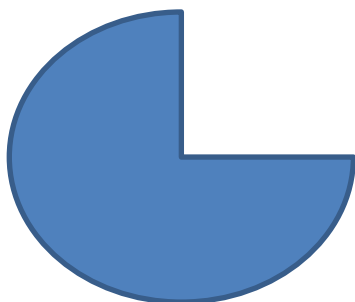
c)  $P^2 - 49$

96. Complete the table of trig Ratios

Angle	Sin	Cos
$0^\circ$		
$30^\circ$		
$60^\circ$		
$90^\circ$	1	

97. The diameter of a circle is 12 cm

Find the Area in terms of  $\pi$  of  $\frac{3}{4}$  of a circle



98. There are 14 boys and 8 girls in a class. What fraction are boys?



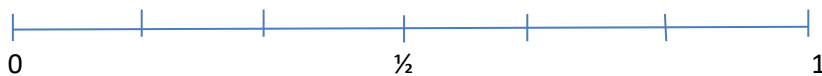
99. Here are three events for an ordinary fair dice.

A Roll an even number

B Roll a number less than 1

C Roll an odd number less than 3

Draw and label arrows to show the probabilities of events A, B and C on the probability scale.



100. 110 students go on a school trip. Each student needs a bottle of water. The water comes in packs of 8.

a) How many packs will be required?

b) If a pack of water costs £2.99 how much will it cost to purchase enough packs?

101. Jim has 68p

Nat has £3.72

Nat gives Jim some money so that they both have the same amount.

How much does Nat give Jim?

102. Liam says,

“If you divide any multiple of 10 by 2 the answer **always** ends in 5”

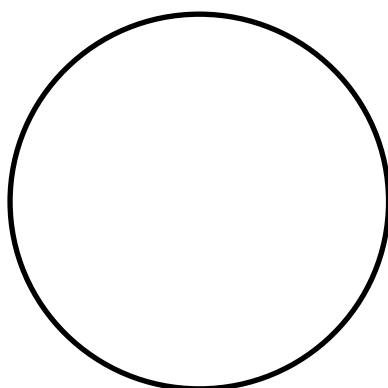
Is he correct?

Write down a calculation to support your answer.

103. The Principle would like to know how many hours a week students are spending on computers while at school. Write a question that would fulfill this task

104. The data below shows the number of birds that were seen in a garden in the morning?  
Draw a pie chart to represent this data

Type	Number		
Black Bird	11		
Sparrow	18		
Thrush	5		
Other	2		



105. What is the order of rotational symmetry of the shape



106. Construct a line of symmetry on the shape below



107 Find the volume of the shape give your answer in  $\text{cm}^3$

