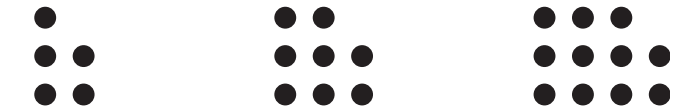
Sample Questions and Mark Schemes

1 The diagram shows the first three patterns in a series of dots.



pattern 1 pattern 2 pattern 3

(a) Complete the table below.

pattern number	1	2	3	4	5
number of dots	5	8	11		

[2]

(b) How many dots will be needed for pattern number 8? _____ [1]

(c) Which pattern needs 62 dots? _____ [1]

(d) Write down a rule connecting the number of dots and the pattern number.

_____

_____ [1]

Mark Scheme for Question 1

Question No. 1

- Recognise, continue and generalise number patterns including finding expressions for the *n*th term
- Use and interpret positive, negative and zero indices

Part	CF[1]	Mark	Answer	Further Information
(a)	Ag5	2	14 and 17	
(b)	Ag5	1	26	
(c)	Ag5	1	20	
(d)	Ag5	1	S = 3n + 2 **or** Number of dots = 3 times pattern number then add 2	Accept other letters
	Total	**5**		

1 CF stands for Curriculum Framework. This column shows which part of the Curriculum Framework is being assessed in the question. The first letter, N, A or S, shows the main area of Mathematics: Number, Algebra or Space. The next letter shows the subtopic – e.g. Number is divided into Properties (p), Problem Solving (s) and Data Handling (d). The number shows which bullet point from that section of the Curriculum Framework is being assessed.

2 **(a)** In 1998 an Australian bought a coin collection for $17550.
Before taking the collection home he had to pay a tax of 22%.
Calculate how much tax he paid.

$ _____ [1]

(b) The collection was originally owned by an American.
He made a profit of 30% when he sold it to the Australian.
Calculate the amount paid by the American.

$ _____ [1]

(c) The American was charged $877.50 for selling the collection.
Give the percentage of the sale price of $17550.

_____ % [1]

(d) The collection was a mixture of bronze and silver coins in the ratio 5 : 2.
The total number of coins in the collection was 4557.
Calculate how many coins were silver.

_____ silver coins [2]

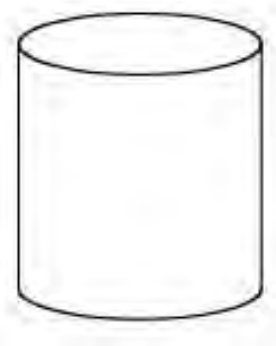
Mark Scheme for Question 2

Question No. 2

- Calculate the percentage of a quantity; express one quantity as a percentage of another; recognise the notation of ratio, use ratio and direct proportion in context

Part	CF	Mark	Answer	Further Information
(a)	Ns1	1	3861	
(b)	Ns1	1	5	
(c)	Ns3	1	$\frac{2}{7}$ x 4557	1 mark for $\frac{2}{5}$ x 4557 seen
		1	1302	
	Total	**4**		

3 The diagram shows a cylindrical can closed at both ends. The height of the can is 15 cm and its radius is 3.5 cm. The volume of the can is 500 ml.



Circumference of a circle = $2\pi r$
Area of a circle = πr^2
Volume of a cylinder = $\pi r^2 h$

(a) **(i)** Calculate the circumference of the circular end of the can.
Give your answer to the nearest whole cm.

_____ cm [1]

(ii) Calculate the area of the circular end of the can.
Give your answer to 1 decimal place.

_____ cm^2 [2]

(b) The height of another can is 12 cm.
The area of its circular end is 24.6 cm^2.
Calculate the volume of this can.

_____ cm^3 [1]

Mark Scheme for Question 3

Question No. 3

- Calculate the perimeter and area of triangles, quadrilaterals and circles, and the volumes derived from these shapes
- Understand approximation to specified numbers of significant figures and decimal places; give appropriate upper and lower bounds for data given to specified accuracy

Part	CF	Mark	Answer	Further Information
(a)(i)	Sm5	1	22	
(ii)	Sm5	1	38.4851	
	Ns4	1	38.5	
(b)	Sm5	1	295.2	
	Total	**4**		

4 Remove the brackets and simplify.

(a) $2(x + 3) + 3x$

_____ [2]

(b) $3(x + 2) - 2(x + 1)$

_____ [2]

(c) $(x + 2)(x - 3)$

_____ [2]

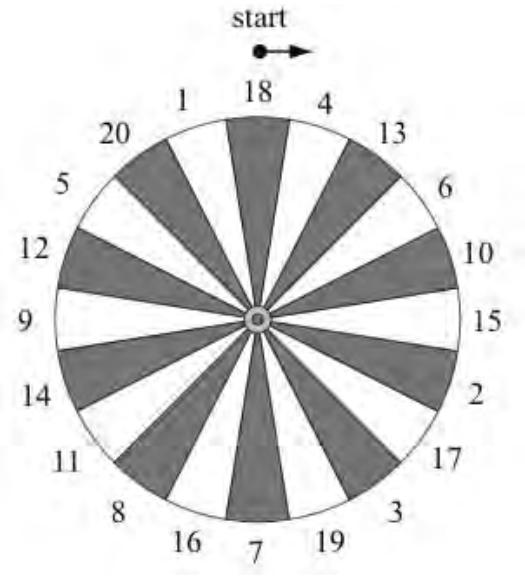
Mark Scheme for Question 4

Question No. 4

- Manipulate directed numbers; use brackets and extract common factors

Part	CF	Mark	Answer	Further Information
(a)	An4	1	$2x + 6$	Mark is for correct removal of brackets
	An4	1	$5x + 6$	Mark is for correct collection of terms Award both marks for correct answer even if working is not shown
(b)	An4	1	$3x + 6$ or $-2x - 2$	Mark is for correct removal of either brackets
	An4	1	$x + 4$	Mark is for correct collection of terms Award both marks for correct answer even if working is not shown **Note:** award 1 mark for $x + 8$
(c)	An4	1	$x^2 - 3x + 2x - 6$	Mark is for correct removal of brackets items in any order, e.g. $-3x + 2x + x^2 - x - 6$)
	An4	1	$x^2 - x - 6$	Mark is for correct collection of terms Award both marks for correct answer even if working is not shown
	Total	**6**		

5



Each section on a circular board has a number between 1 and 20, as shown on the diagram. Starting each time at 18, and working **clockwise**, give the **first number** that satisfies the following conditions:

(a) is a prime number

_____ [1]

(b) is a multiple of 2, 3, 4 and 6

_____ [1]

(c) is a an odd square number

_____ [1]

(d) is the **square root** of an even number on the board

_____ [1]

Mark Scheme for Question 5

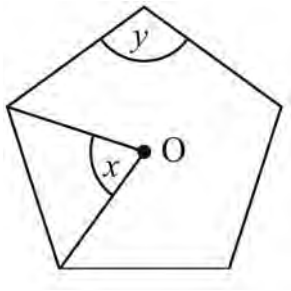
Question No. 5

- Use prime numbers, common factors and common multiples, squares, square roots and cubes of numbers

Part	CF	Mark	Answer	Further Information
(a)	Np4	1	13	
(b)	Np4	1	12	
(c)	Np4	1	9	
(d)	Np4	1	4	Accept 2
	Total	**4**		

6

NOT TO SCALE

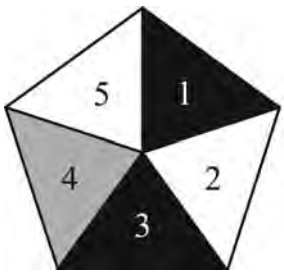


A spinner, made in the shape of a **regular** pentagon, is shown.
O is the centre of the pentagon.

(a) Calculate the size of:

(i) angle x $x =$ _____º [1]

(ii) angle y $y =$ _____º [1]



The spinner is shaded and numbered as shown in this picture.

(b) Calculate the probability that the spinner will:

(i) land on a black odd number. Give your answer as a fraction.

_____ [1]

(ii) land on a white even number. Give your answer as a decimal.

_____ [1]

(iii) not land on a grey number. Give your answer as a percentage.

_____ % [1]

Mark Scheme for Question 6

Question No. 6

- Calculate unknown angles using the properties of: angles at a point, angles formed within parallel lines and angle properties of triangles and quadrilaterals
- Calculate the probability of a single event

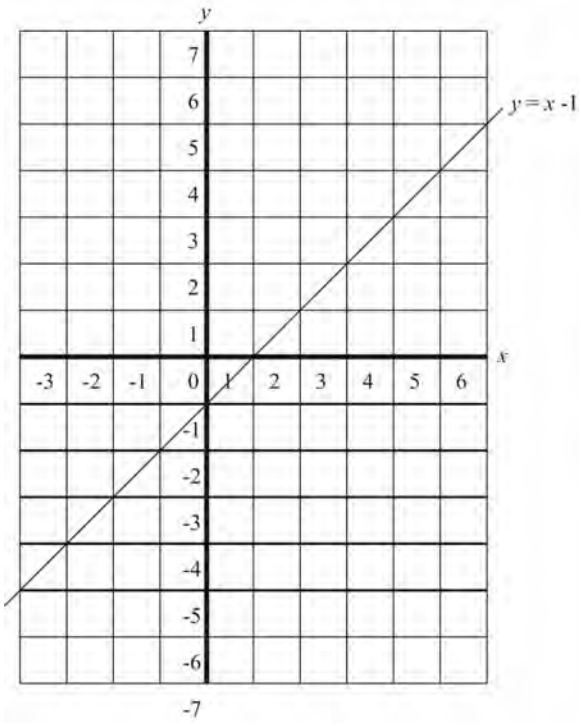
Part	CF	Mark	Answer	Further Information
(a) (i)	Sg2	1	72	
(ii)	Sg2	1	108	
(b) (i)	Nd3	1	$\frac{2}{5}$	If probability is given in wrong format, penalise only once in this question
(ii)	Nd3	1	0.2 or .2	
(iii)	Nd3	1	80	
	Total	**5**		

7 **(a)** Complete the table below for the graph $y = 2x - 3$

x	–2	–1	0	1	2	3
y	–7			–1		3

_____ [2]

(b) On the grid below draw the graphy of $y = 2x - 3$



(c) Write down the gradient of the graph $y = 2x - 3$

Gradient = _____ [1]

(d) The graph of $y = x - 1$ is also drawn on the grid above.
Use your graph to solve the simultaneous equations: $y = 2x - 3$ and $y = x - 1$

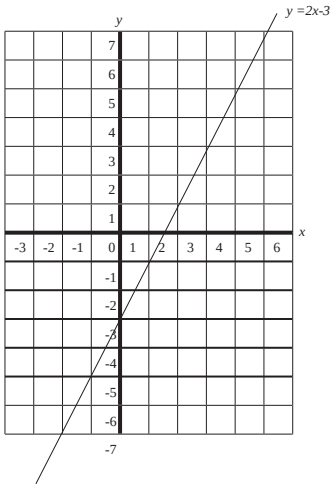
x = _____

y = _____ [2]

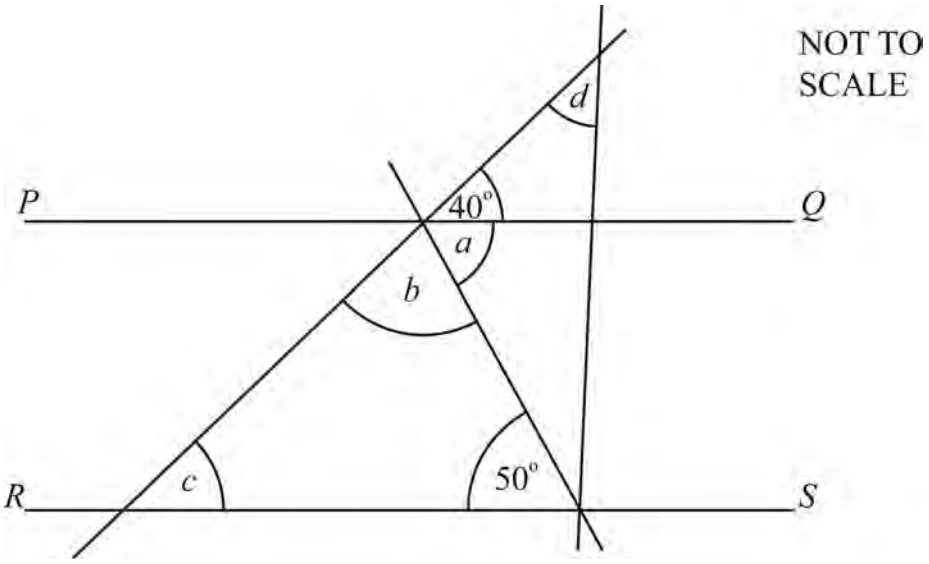
Mark Scheme for Question 7

Question No. 7

- Draw and interpret the graphs of simple functions, use tables of values and find the gradient of straight line graphs
- Find the solution of linear and simple simultaneous equations using graphs

Part	CF	Mark	Answer	Further Information
(a)	Ag1	2	–5, –3, 1 (missing values in this order)	Award 1 mark for one or two correct entries
(b)	Ag1	1		
(c)	Ag1	1	2	
(d)	Ag4	1	$x = 2$	
	Ag4	1	$y = 1$	
	Total	**6**		

8



In the diagram *PQ* is parallel to *RS*.

Find angles *a, b, c* and *d*.

a = _____ º [1]

b = _____ º [1]

c = _____ º [1]

d = _____ º [1]

Mark Scheme for Question 8

Question No. 8

- Calculate unknown angles using the properties of: angles at a point, angles formed within parallel lines and angle properties of triangles and quadrilaterals

Part	CF	Mark	Answer	Further Information
(a)	Sg2	1	50	
(b)	Sg2	1	90	
(c)	Sg2	1	40	
(d)	Sg2	1	40	
	Total	**4**		