Mathematics Challenge 2014

25th January 2014

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YEAR 6

Model Answers

We provide these model answers of our CWN: Mathematics Challenge 2014 exam to help parents.

Please note that for some problems there are more than one possible answer.

Some questions are open ended.

We strongly advise all children to practise the papers and think hard before looking at the answers provided.

Full answers and explanations will be provided on our feedback sessions.

In general, we expect units, directions, sensible answers and reasons in all questions.

Q1)

(a) List out the first five prime numbers.

2, 3, 5, 7, 11

(1 mark)

(b) Circle the prime numbers in the grid below.

51 52 (53) 54 55 56 57 58 (59) 60
(61) 62 63 64 65 66 (67) 68 69 70
(71) 72 (73) 74 75 76 77 78 (79) 80
81 82 (83) 84 85 86 87 88 (89) 90
91 92 93 94 95 96 (97) 98 99 100

(1 mark)

Q2) Here are five number cards. Using three of them make the calculation correct.

$$\frac{1}{2} \qquad 1\frac{1}{2} \qquad 2 \qquad 2\frac{1}{2} \qquad 3\frac{1}{2}$$

$$\left(2\frac{1}{2} + 3\frac{1}{2} \right) \times 2 = \mathbf{12}$$

(1 mark)

Q3)
(a) The letters **x**, **y** and **z** each represent an integer.

- They add together to make 1500.
  That is: $x + y + z = 1500$
- **y** is three times as large as **z**.
- **z** is half of x.

Find **x**, **y** and **z**.

x = 500   y = 750   z = 250

(1 mark)

(b) A mango and apple cost 65p. Three mangos and five apples cost £2.21.

What are the prices of a mango and an apple?

One mango costs 52 pence
One apple costs   13 pence

(1 mark)

Q4)

(a) There are three numbers on the number line having cubes the same as the original numbers.

What are they?

-1 ,   0 , 1   (1 mark)

(b)   1, 1, 2, 3, 5, 8, 13, …

This is a famous sequence.
What are the next three numbers?

21, 34, 55   (1 mark)

(c)   18, 46, 94, 63, 52, 61, 90, …

What is the next term?

40   (1 mark)

Q5) Write a number in each of these boxes so that the **mean** of the five numbers is 11 and the **range** is 4.

Any correct answer, for example:

9	10	11	12	13

(1 mark)

Q6)

(a) What fraction is the recurring decimal   3.353535…. ?
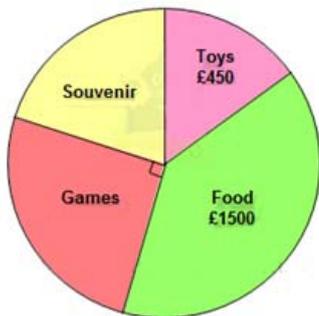
$$3\frac{35}{99} \qquad \text{(1 mark)}$$

(b) What is the decimal **equivalent** of:

$$\frac{7}{11}$$

0.636363…   or $0.\dot{6}\dot{3}$

(1 mark)

Q7) A community charity organized a racial harmony fair through which it collected a sum of £3600. The pie chart below shows the amount of money collected by the various stalls.

(a) How much did they collect through games?

£900   (1 mark)

(b) How much did they collect through souvenirs?
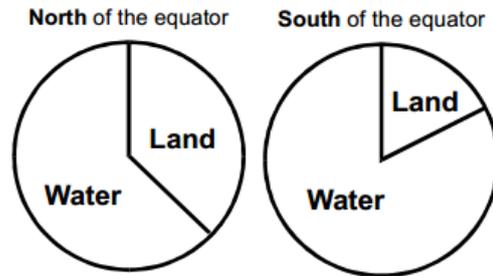
£750   (1 mark)

(c) What percentage was collected through games?

25 %   (1 mark)

(d) What fraction (in simplest form) was collected through souvenirs?

$$\frac{5}{24} \qquad \text{(1 mark)}$$

Q8) These pie charts show the area of the Earth's surface covered by water and land north and south of the equator.

(a) Where is more land? Tick (✓) the correct answer.
Accept either one, but NOT both, of the answers below.

[✓] In the North

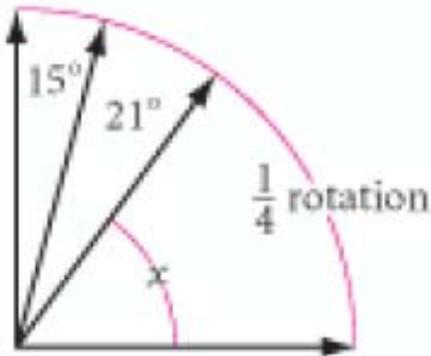[ ] In the South

[✓] We cannot tell

(1 mark)

(b) Where do you think more people live? Tick (✓) the correct answer.
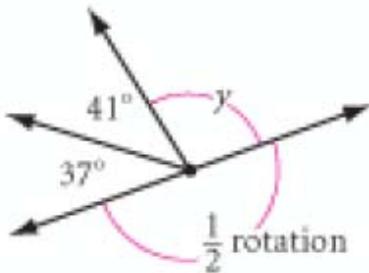
[ ] In the North

[ ] In the South

[✓] We cannot tell

(1 mark)

Q9) Calculate the size of angles x, y, z in the diagrams below.
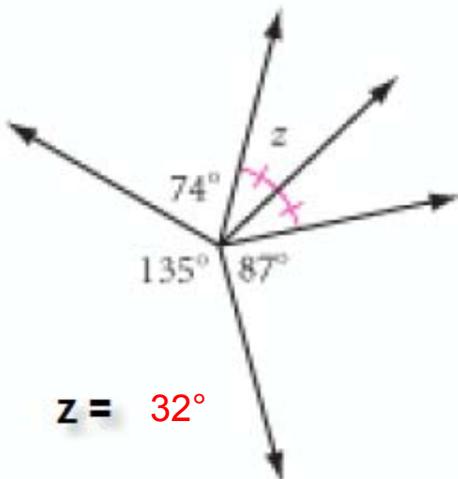

X =   54°

(1 mark)

y =   102°

(1 mark)

z =   32°

(1 mark)

Q10) A clothing merchant has 3600 pieces of clothing of 5 types. The pie chart below represents what fraction of the clothing we sold. PQ is the diameter of the circle on the pie chart.

(a) What is the probability a customer will choose a shirt?

$\frac{1}{8}$ (1 mark)

(b) How many skirts were sold?

720   (1 mark)

Q11) Using the result:

72.4 x 87.8 = 6356.72

Work out:

(a) 0.724 x   878   = 635.672

(½ mark)

(b) 7.24 x   8.78   = 63.5672

(½ mark)

Q12)

(a) There are 20 boys and 10 girls in Class 6. Write a sentence using the word *ratio*.

Either:
- The ratio of boys to girls is 2 : 1
or
- The ratio of girls to boys is 1 : 2

(1 mark)

(b) Look at this Carroll Diagram.

	glasses	No glasses
Boys	1	2
Girls	3	4

Write a question that has the answer:

i. 3 : 7

Any valid question for example:
- What is the ratio of **boys to girls**?
- What is the ratio of girls wearing glasses to rest of the children who don't wear them?

(1 mark)

ii. 40%

Any valid question for example:
- What is the percentage of children wearing glasses?
- What percentage of children are girls who don't wear glasses?

(1 mark)

Q13) George is doing some reporting for his local paper. The subject of his article is 'holidays'.
As part of his report he decides to question 10 of his friends whether they prefer caravanning or camping holidays. Seven out of 10 say that they prefer caravanning, so George writes the dramatic headline:
"The probability that someone prefers caravanning to camping holidays is 7/10"
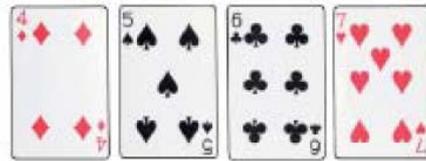What is wrong with George's method?
He did not take a **random** sample of the population and he did not ask a lot of people.

(1 mark)

Q14) Which of these playing cards have reflectional symmetry?
Tick (✓) the ones applicable.
None of the cards should be ticked.

(1 mark)

Q15)
One bag of 6 green apples cost 75p.
One bag of 10 red apples cost 90p.
James bought some bags of green apples and some bags of red apples.
He spent £4.20.
(a) How many bags of each type of apples did he buy?

2 bags of green apples and
3 bags of red apples

(1 mark)

(b) Which bag of apples is better value for money?
Red   (1 mark)
Explain why.
(Based on the given information:)
Accept either of these:
○ red apple costs 9p and 1 green apple costs 13p (to the nearest penny), or
○ 1 red apple is cheaper than 1 green apple, or
○ 1 green apple is more expensive than 1 red apple.

(1 mark)

Q16)

(a) Tick (✓) the **correct** statement(s):

☐ All numbers that end in 2 are multiples of 4

☐ All numbers that end in 3 are multiples of 3

☐ All numbers that end in 4 are multiples of 4

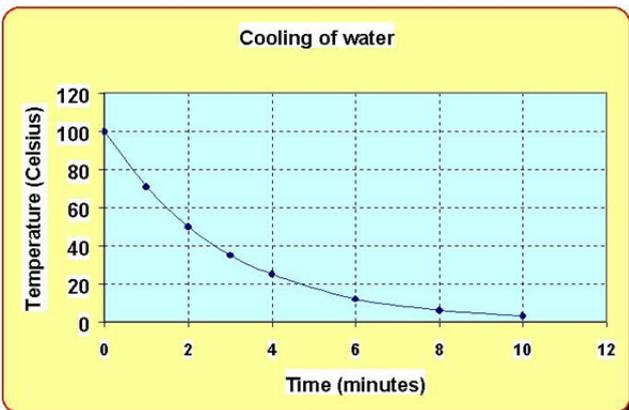☑ All numbers that end in 5 are multiples of 5

(1 mark)

(b) Tick the statement(s) that are **TRUE**:

☐ 1 is a prime number

☐ 1 is an even number

☑ 1 is a square number

☑ 1 is a cube number

(1 mark)

Q17) This graph shows how the temperature of a cup of water changes as it cools during winter.

Cooling of water

(a) Use the graph to estimate how long it takes for the temperature to reach 40°C from 80°C.

2 minutes (1 mark)

(b) The hotter the water the less time it takes to cool. Explain this effect using the graph.

Any sensible answer including a comparison, e.g.:

At 100°C it took 2 minutes for the temperature to drop 30°C to 70°C. At 50°C it took 2.5 minutes for the temperature to drop the same amount.

The temperature cools faster when hotter. (1 mark)

Q18) Using the temperatures below answer the questions.

Temperature Changes

London +13°C → Beijing −15°C

Paris +22°C ← Vancouver −11°C
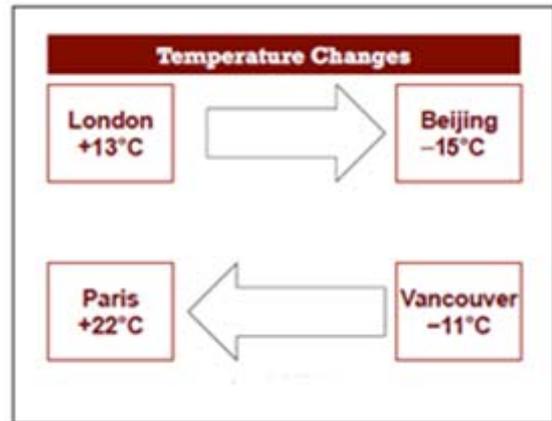
(a) If I fly from London to Beijing, does the temperature rise or fall?

fall

(½ mark)

What is the change in temperature? Show your working out.

-15°C - 13°C
= -28°C (½ mark)

(b) If I fly from Vancouver to Paris, does the temperature rise or fall?
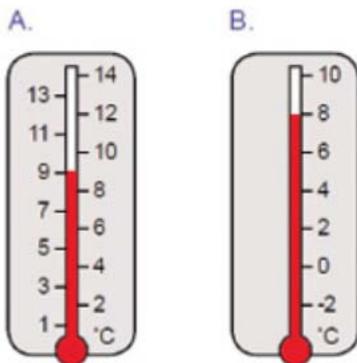
Rise   (½ mark)

What is the change in temperature?

22°C – (-11°C)
= 33°C   (½ mark)

(c) I travelled between cities. The temperature change was +24°C. What was my journey?
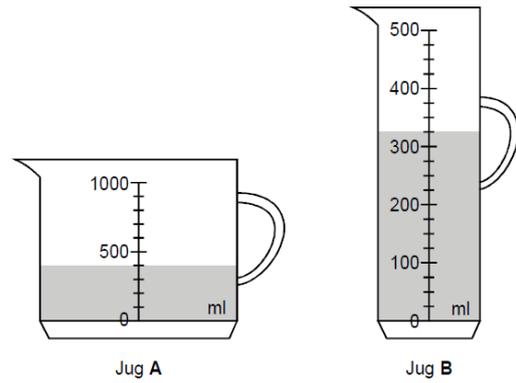
Vancouver to London

(1 mark)

Q19) Read the scales:

A.   B.

(a) Which thermometer, A or B can measure the lowest temperature?
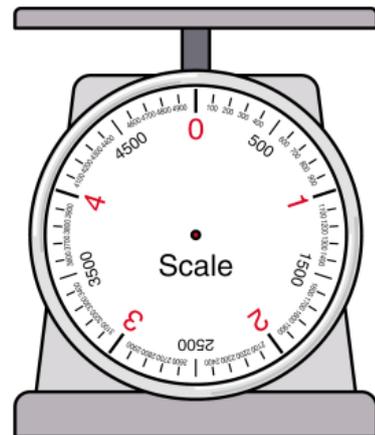
B   (½ mark)

(b) What is the difference between the volumes of liquids in the above jugs?

75 ml
(½ mark)

(c) What is the capacity of jug B?

(More than) 500 ml

(½ mark)

(d) What is missing for use in the scale?

Measuring units or measuring scale

AND   Pointer or "hand"

(½ mark)

Q20) Use the numbers in the grid to answer the questions below.

5.6	3.78	10.765	4.87	16.65
19.63	12.88	4.765	3.235	9.435
5.13	53.87	32.81	15.37	1.238

(a) The highest whole number?

There are no whole numbers.

(½ mark)

(b) The number closest to 45

53.87   (½ mark)

(c) The smallest number with three decimal places?

1.238   (½ mark)

(d) The highest row total
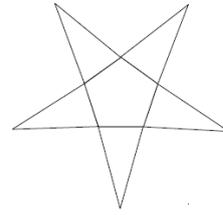
108.418   (½ mark)

Q21) There are six more girls than boys in Ms Juliet's class of 24 pupils. What is the ratio of girls to boys in this class?

15 : 9

or 5 : 3

(1 mark)

Q22) This is a 2D net of a 3D shape:

(a) What is the mathematical name of the 3D solid?

Pentagon based pyramid or pentagonal pyramid

(1 mark)

(b) What is the **order** of rotational symmetry of the 2D net?

5   (1 mark)

Q23) Look at the timetable of trains and ferries from London to Dublin (Ireland).

Train and ferry timetable				
London to Dublin				
London Euston train depart:	06:46	09:00	11:28	19:38
Holyhead train arrive:	11:30	13:03	15:30	23:29
Change trains at:	Crewe	direct	Crewe	direct
Holyhead ferry depart:	12:00	14:10	17:15	02:40
Dublin Ferryport arrive:	13:49	17:25	19:04	05:55

(a) How long does the first train from London Euston take to travel to Holyhead?

4 hours and 44 minutes
(½ mark)

(b) If you arrive at Holyhead at 15:30, how long do you have to wait for the ferry to depart?

1 hour and 45 minutes
(½ mark)

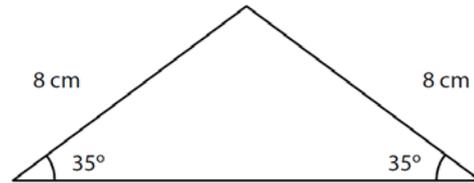**(c)** If you have to be in Dublin by 2:00 pm, which train would you catch from London Euston?

The first train
or the train that departs at 06:46
(½ mark)

(d) Which of these journeys from London to Dublin is the quickest?

The first train
or the train that departs at 06:46

(½ mark)

Q24)

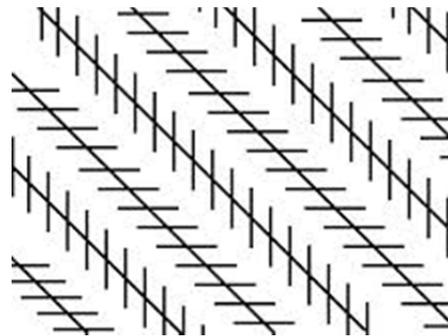**(a)** What kind of triangle is this?

Isosceles
(1 mark)

(b) What is the size of the third angle unmarked?

110°

(1 mark)

Q25)

Ignoring the short-crossed lines the eight diagonal lines are:

(Circle the correct answer)

- Parallel

- Not parallel

- Perpendicular

- None of the above

(1 mark)