Mathematics Challenge 2015

by

Children's Well-wishers Network (CWN)

YEAR 5

Mark Scheme

We provide mark schemes of our CWN Mathematics Challenge 2015 examination papers 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) In the computer store there was a display saying 20% off everything that were on sale.

I wished to buy a scanner, which was marked as £40.

I had to pay £40. Why?

Because the scanner was not on sale.

(½ mark)

(b) My sister bought a printer that was on sale. She paid £120. What was its original price?

£150

(½ mark)

When she went to pay for it, the checkout operator said she could give her a further 5% off if she opened a store card. What would have been the price if she opened a store card?

£112.50

(½ mark)

Q2)

(a) Find the greatest number that will divide 63, 75 and 129 so as to leave the same remainder in each case.

LCM of pairwise difference

= 6

_____

(1 mark)

(b) The product of two numbers is 2028 and their H.C.F. is 13.

Write two such pairs of numbers.

Pair 1: 13 , 156

Pair 2: 39 , 52

(2 marks)

Q3)

(a) If one-third of one-fourth of a number is 5, then three-tenth of that number is:

18

(½ mark)

(b) Add $\frac{7}{8}$ and $2\frac{3}{4}$

$= \frac{7}{8} + 2\frac{6}{8}$

$= 3\frac{5}{8}$

(1 mark)

(c) Uncle Bob gave seven-eighths of his money to Ram. Dad gave $2\frac{3}{4}$ of his money to Ram.

Ram says he could not work out how much he would get. Why?

Ram does not know how much Uncle or Dad has.

(½ mark)

Q4) A mad man ruins a railway track for 30 days.

(a) What is the probability that he will ruin it again for 1 more day?

Most likely

(½ mark)

(b) What is the probability that he will rebuild the track?

Describe with justification.

Less likely he would recover from his madness.

(½ mark)

Q5)

(a) Four employees Shun, Shah, Shiva, Sakthi, earn respectively:

£ 582,787
£ 791,787
£ 546,130
£ 565,255.

Who is the second most earner?

Shun

(½ mark)

(b) A doctor gives you three pills telling you to take one every half hour and asks you to start the course immediately.

How many minutes would the pills last?

60 minutes

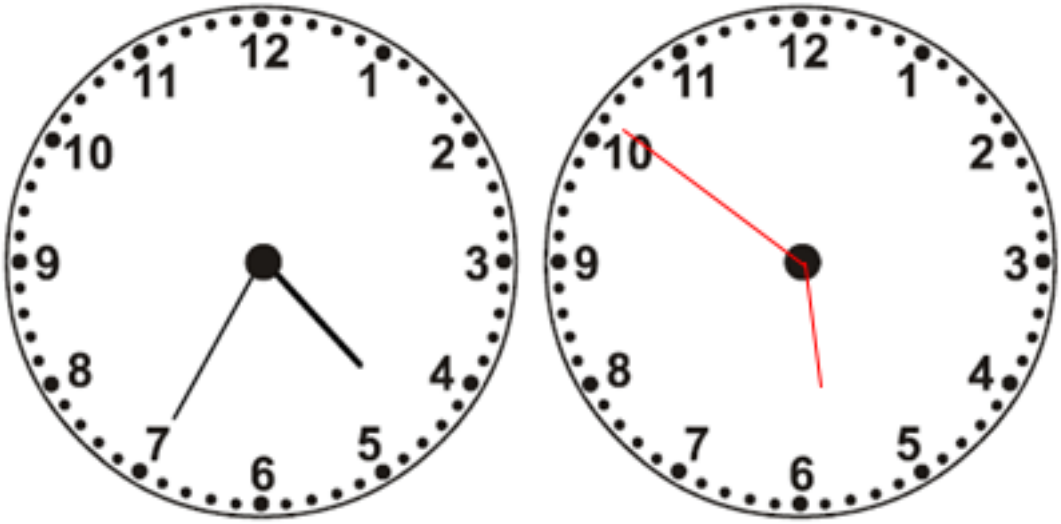
(½ mark)

(c) Complete the missing two numbers.

694, 721, 687, 714, 680, 707, 673, 700

(1 mark)

Q6) Look at these clocks:

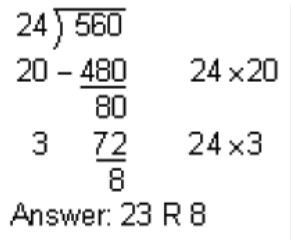


If the left-hand clock shows the time now, what time will it be in 1 hour 16 mins? Indicate your answer in the right hand clock.

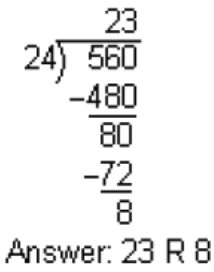
(1 mark)

Q7) Two students work out how many packs of 24 they can make from 560 biscuits. They show their working out as follows.

Student 1:



Student 2:



There are other strategies for the layout of long division.

Using any strategy of your choice, work out: 984 ÷ 24.

Show your method clearly in the space below.

Another method using "Reducing fraction" method

$\frac{984}{24}$

Dividing TOP and BOTTOM by 12:

$= \frac{82}{2}$

$= 41$

(Any method is ok)

(1 mark)

Q8)

(a) Jack wanted to stack the books on a wooden straight bookshelf of height 2.25m, width 1m and depth 30cm.

The bookshelf has 8 fixed shelves, equally spaced, to stack the books and has wood on the top and sides.

0.2 m of height is used up by 8 blanks of wood on which books are stacked. The thickness of top and side woods each 0.05m.

Assume no books are stacked over the top.

All the books have the same dimension:
height (25 cm), length (30 cm) and thickness (10cm)

How many books can be stacked?

(2.25 – 0.2 – 0.05) / 0.25 *
(1 - 2 x 0.05) / 0.1 *
0.3 /0.3

8 * 9 * 1

72 books

(2 marks)

(b) Jill comes with another idea for a bookshelf:

What do you notice in his elegant idea?

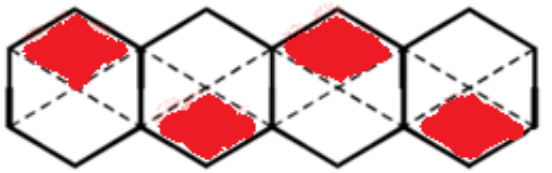
(1) Sides are NOT straight

(2) Shelves are not equally spaced.

(3) Some shelves are not horizontal.

(3 marks)

Q9) This diagram shows four regular hexagons. Shade in one third of the diagram.

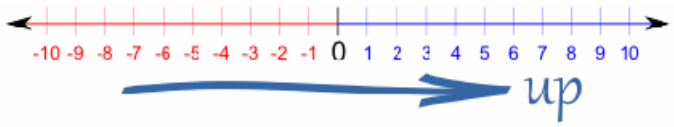


1 rhombus = 2 triangles
1 triangle = 1 unit
8 units need to be shaded to get a third.

(1 mark)

Q10) There are many types of rounding figures.

A common method is **rounding up**:



(a) Using this method find the nearest whole number of: − 7.5

-7

(½ mark)

(b) **Round** 7.49 to nearest whole number.

7

(½ mark)

(c) If there are 15 single slippers left outside a temple how many people have visited the temple?

Give your reason.

We cannot say exactly.
There are many answers that can be reason out.

(½ mark)

(d) If you have £15 in hand and would like to buy some toys costing £2 each, how many toys can you buy?

7

(½ mark)

Q11)

(a) Estimate the angle**:**

Answer: 140 - 160°

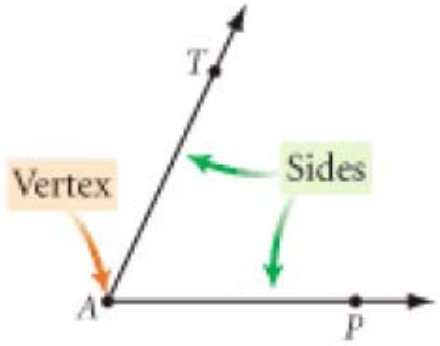
(½ mark)

What type of angle is this?

Obtuse

(½ mark)

(b) Name the angle between the sides in a 3-letter format.



$\angle TAP$ or $\angle PAT$ or $\widehat{TAP}$ or $\widehat{PAT}$

(½ mark)

(c) The old television antenna is a physical model of an angle:

What is the effect on the angle by increasing the length of the antenna? Circle the correct answer:

- The size of the angle will increase
- The size of the angle will decrease
- The size of the angle will remain same

(½ mark)

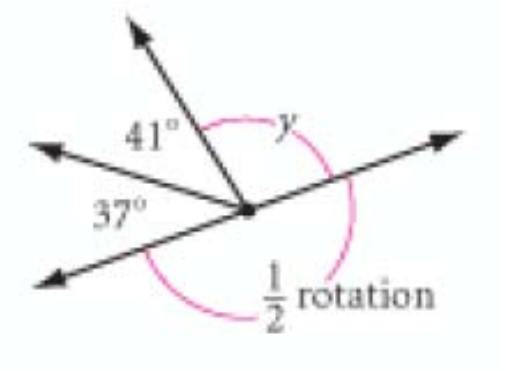
(d) A physician may assess how much physical therapy a patient needs by measuring the degree to which a patient can bend his or her ankle from the floor.

Estimate the angle between the patient's foot and the floor.

45° - 50°

(½ mark)

(e) Work out the unknown angle y.

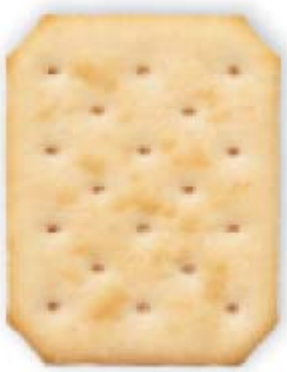


y = 102°

(½ mark)

Q12)

(a) What is the geometrical name of the shape behind this biscuit?



(Irregular) octagon

(½ mark)

(b) How many triangles are in the following shape:

53 **(1 mark)**

(c) If the area of each small triangle in the above shape is 1 cm^2 what is the area of the whole shape?

64 cm^2

(1 mark)

Q13)

(a) Solve this puzzle:

If 8 + 2 then 164
If 10 + 5 then 502
If 14 + 2 then 287
If 6 + 3 then 182

If 10 + 2 then 205

(1 mark)

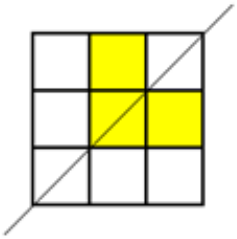
(b) Which of the numbers underlined above are composite?

All

(½ mark)

Q14) Below there are 6 empty grids and one example. Shade each empty grid so that the result has just 1 line of symmetry. For each result show the line of symmetry too as shown in the example.

Example:

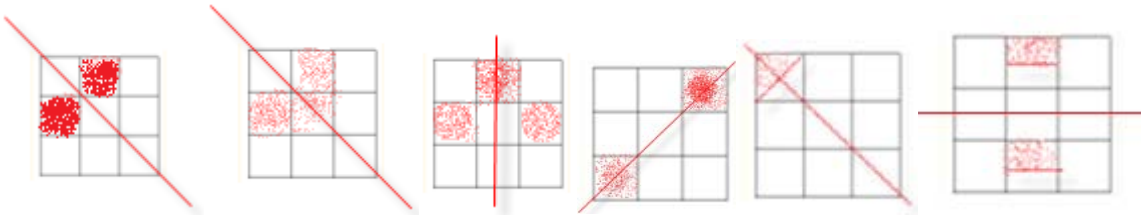


Award ½ mark for 3 correct diagrams

Award 1 mark for 6 correct diagrams

Empty grids for shading:

Many possible answers, for example:



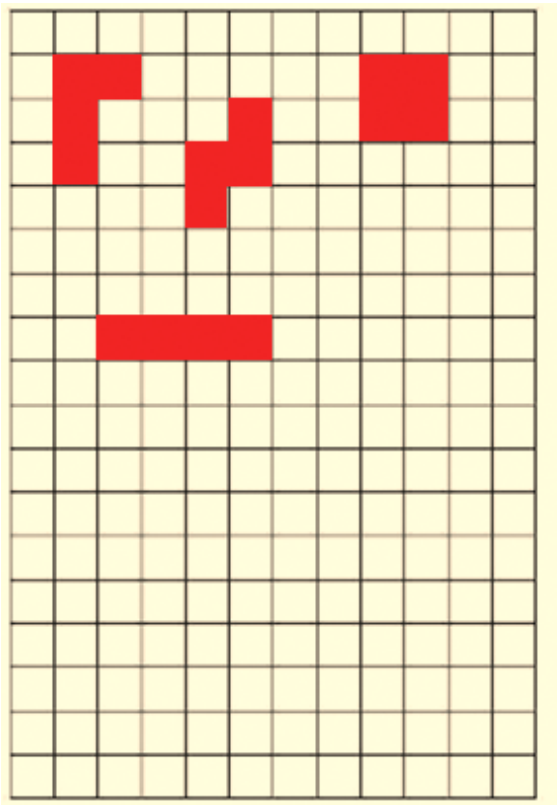
(1 mark)

Q15) A tetromino is made up of four squares joined edge to edge, for example:

A ***distinct*** tetromino cannot be mapped onto itself by translation, rotation, reflection or any combinations of them.

There are 4 more ***distinct*** tetrominos. Sketch them on the grid on the right.

Award ¼ mark for each distinct tetromino that is different to the example shown above.



(1 mark)

Q16)

(a) Selvam uses three numbers to form pairs and adds them together. When he does this he gets these totals: 17 , 28 and 35.

What are his three numbers?

5 , 12 , 23

(½ mark)

(b) Selvi too has three numbers. She finds the **products** in pairs and gets: 40, 60 and 96.

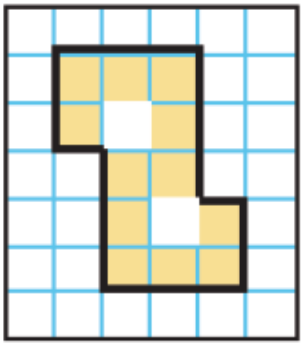
What are those three numbers?

5 , 8 , 12

(½ mark)

Q17)

(a) Find the area of the shaded part in the grid. 1 small square has 1 cm^2 area.



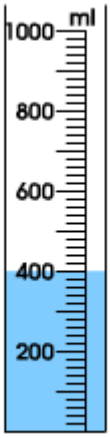
12 cm^2 **(½ mark)**

(b) Find the perimeter of the above Z shape.

18 cm **(½ mark)**

Q18)

(a) What is the volume of liquid indicated in the cylinder?



400 ml

(½ mark)

i) How much can we measure using this measuring cylinder?

Any amount up to 1000ml

(½ mark)

ii) Estimate the capacity of this cylinder.

1060 ml **(½ mark)**

(b) Look at this jug and answer the questions below:

i) How much is 2000 ml in fluid ounce (fl. oz)?

70 fl. oz. **(½ mark)**

ii) Estimate 1 pint in ml?

Accept 575ml to 600 ml **(½ mark)**

iii) Do you think that the scales are equally spaced? Why?

No
The cross-section of the jug varies

(½ mark)

Q19)

(a) This is a normal aluminium paperclip that weighs 1 gram.

How many clips will weigh 1 kg?

1000 **(½ mark)**

(b) Things like cars, trucks and large cargo boxes are weighed using the metric tonne.

The above car weighs 2 metric tonnes

How many paper clips will balance the weight of the above car?

2,000,000 **(½ mark)**

Q20)

(a) A child saves a penny a day to purchase a bicycle.

A bicycle on a sale costs £73.

Estimate the number of months she needs to save.

240 (months) **(½ mark)**

(b) Ram was born on 2004 and lived for 80 years. He enjoyed his birthday once in four years only. Why?

He was born on Feb 29th

(½ mark)

(c) There two pairs of consecutive months with 31 days. Which are they?

1. July , August

2. December , January

(1 mark)

Q21)

(a) How will you convert to metres from centimetres?

By dividing the centimetres by 100

Bonus **(½ mark)**

(b) Measure the perimeter of this shape :

Perimeter: Accept 11.6 – 11.8 cm

(½ mark)

(c) John's house is 2.5 km from his working place. He goes to work on foot every day. He walks 100 m per minute.

i) How long will he have to walk in metres?

2500 m

(½ mark)

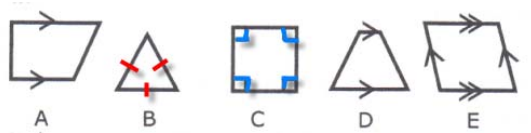
ii) How long will he take for his journey?

25 minutes

(½ mark)

Q22)

(a) One of the following 2D shapes is different to others.



Explain by completing the following sentence:

B is different to others because it is

triangle while the other

shapes are quadrilaterals.

(½ mark)

(b) The properties of the shapes have been indicated with marks.

i) What do the pairs of arrows show?

Parallelism

(½ mark)

ii) What do the tiny red lines show in the shape B?

Equality or equal sides

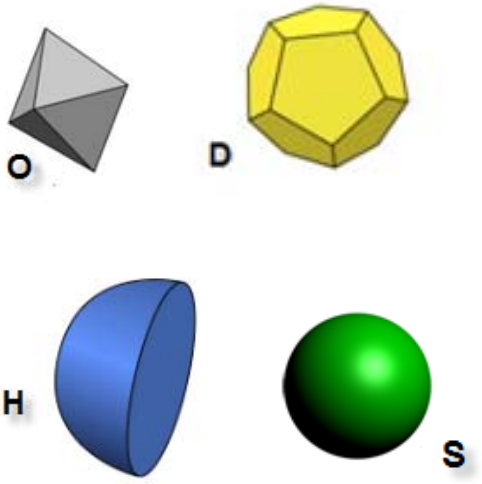
(½ mark)

iii) What do the tiny blue lines show in the shape C?

90° or right angles

(½ mark)

Q23) The following are 2D representations of 3D shapes.



(a) Name the shapes.

O: Octahedron **(½ mark)**

D: Dodecahedron **(½ mark)**

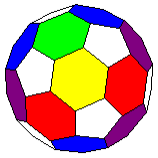
H: Hemisphere **(½ mark)**

S: Sphere **(½ mark)**

(b) Which of the shapes do not have **nets** from which the above shapes can be made?

H and S **(½ mark)**

(c) A buckyball could be made of 20 hexagons and 12 pentagons.

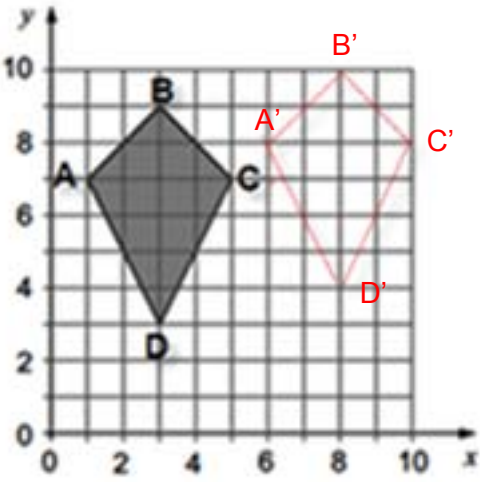


Is this object a perfect sphere?

No **(½ mark)**

Q24)

(a) Draw the image of the kite after you translate it by vector: $\begin{pmatrix} 5 \\ 1 \end{pmatrix}$



(½ mark)

(b) What do you notice after the transformation in terms of :

Orientation: does not change

Size: does not change

Shape: does not change

Position: changes

(2 marks)

(c) Label image as A'B'C'D' where A' is the image of A, B' is the image of B and so on.

Join C and C', D and D', B and B'.

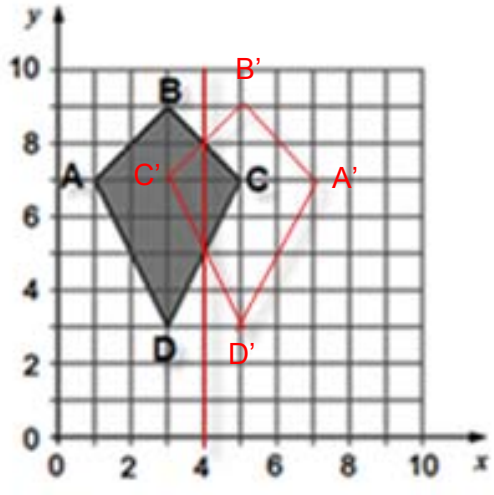
What can you say about the lines BB', CC', DD'?

They are parallel to each other.

(½ mark)

Q25)

(a) Draw the image of the kite after you reflect it on the red line shown.



(1 mark)

(b) What do you notice after the transformation in terms of :

Orientation: changes

Size: does not change

Shape: does not change

Position: changes

(2 marks)

(c) Now label the image as A'B'C'D' where A' is the image of A, B' is the image of B and so on.

Join C and C', D and D', B and B'.

What can you say about the lines BB', CC', DD' in relation to red line?

All are perpendicular to mirror line

(½ mark)

