**GCSE Mathematics**

**1MA1**

**Problem-solving questions 3**

**Foundation Tier: Bronze**

**Time: 1 hour 30 minutes**

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Calculator permitted

Questions with \* could be seen on Higher Tier

**1.** A solid cuboid is made from centimetre cubes.

The diagram below shows the bottom layer of cubes in the cuboid.

The volume of the cuboid is 60 cm3.

(a) Write down the width and length of the cuboid.

(b) Find the height of the cuboid.

**(2)**

**(Total for question 1 is 2 marks)**

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**2.** Harry works as a gardener.

The table shows the length of time Harry worked last week.

|  |  |  |
| --- | --- | --- |
|  | **Morning** | **Afternoon** |
| **Monday** |  1 hour 30 minutes |  |
| **Tuesday** |  2 hour 5 minutes |  2 hours  |
| **Wednesday** |  |  |
| **Thursday** |  1 hour 28 minutes |  |
| **Friday** |  |  2 hour 15 minutes |

(a) Work out the total time Harry worked last week in hours and minutes.

**(1)**

(b) Convert the total time Harry worked last week into minutes.

**(1)**

Charlotte is also a gardener.

She worked for 580 minutes last week.

(c) Who worked as a gardener for the greater length of time last week, Harry or Charlotte?

You must give a reason.

**(1)**

**(Total for question 2 is 3 marks)**

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**3.** Work out the number that is halfway between  and 1.8

(a) Convert  into a decimal.

**(1)**

(b) Work out the number that is halfway between  and 1.8

**(1)**

**(Total for question 3 is 2 marks)**

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**4.** The diagram shows four poles **A**, **B**, **C** and **D** in a straight line in a field.

The diagram also shows the distance between poles **A** and **B** and the distance between

poles **C** and **D**.

 **A B C D**

 X X X X

 20 metres  16 metres

The total distance between poles **A** and **D** is 60 metres.

Samuel plants bushes in a straight line, a metre apart, between **B** and **C**.

He does not plant a bush at **B** or at **C**.

(a) Work out the distance between **B** and **C**.

**(1)**

(b) Work out how many bushes he plants between **B** and **C**.

**(2)**

**(Total for question 4 is 3 marks)**

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**5.** A small slab weighs 9 pounds.

Tom can carry a maximum weight of 50kg.

1 kilogram = 2.2 pounds

(a) Work out the weight of each slab in kilograms.

**(1)**

Tom can carry a maximum weight of 50kg.

(b) Work out the number of slabs Tom can carry.

Give your answer to 2 decimal places.

**(1)**

 (c) Write down the maximum number of small slabs Tom can carry.

**(1)**

**(Total for question 5 is 3 marks)**

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**6.** Jaya has 2 dogs.

Each dog eats  of a tin of food in the morning.

Each dog eats  of a tin of food in the evening.

Each tin of food costs 72p.

(a) Work out the number tins of food to feed one dog for 1 day.

(b) Work out the number tins of food to feed the dogs for 1 day.

**(1)**

(c) Work out the number tins of food to feed the dogs for 12 days.

**(1)**

(d) Work out the total cost of the tins of food to feed the dogs for 12 days.

**(2)**

**(Total for question 6 is 4 marks)**

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**7.** Tanya wants to print some photographs.

She finds two printing companies.

**Infinity Printers**

Cost in pence

= 30 × colour prints + 10 × grey prints

**Snappy Print**

Cost in pence

= 15 × number of prints + 50

Tanya needs 5 colour prints and 3 grey prints.

(a) Work out the cost of the prints for Infinity printers.

**(1)**

(b) Work out the cost of the prints for Snappy Print.

**(1)**

Tanya wants to spend the least amount of money.

(c) Which printing company should she choose?

You must give a reason.

**(1)**

**(Total for question 7 is 3 marks)**

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**8.** Patrick buys some fruit.

He buys 1.6 kg of bananas and 0.7 kg of apples.

The total cost for this fruit is £3.18

Bananas cost 85p per kg.

(a) Work out the cost of the bananas.

**(1)**

(b) Work out the cost of the apples.

**(1)**

(c) Work out the cost of 1 kg of apples.

**(2)**

**(Total for question 8 is 4 marks)**

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**9.** *F*

 5*x* − 45

 *A y B*

 2*x* + 15

 *C z D*

 *E*

*AB*, *CD* and *EF* are straight lines.

(a) Write down an equation in terms of *x*.

**(1)**

(b) Solve the equation for *x*.

**(1)**

(c) Work out the size of angle *y*.

**(1)**

(d) Work out the size of angle *z*.

**(1)**

**(Total for question 9 is 4 marks)**

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**10.** Annabel buys 50 plums for £5

She sells 6 bags of 7 plums at 90p per bag.

She sells the rest of the plums at 12p each.

(a) Work out the cost of 6 bags of plums.

**(1)**

(b) (i) Work out the remaining number of plums.

(ii) Work out the cost of the remaining number of plums.

**(1)**

(c) Work out the total cost of the 50 plums.

**(1)**

(d) Work out the profit.

(e) Work out her percentage profit.

 **(2)**

**(Total for question 10 is 5 marks)**

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**\*11.** There are 884 members of an online language club.

The ratio of the number of males to the number of females is 8 : 9

(a) Work out the number of

(i) males,

(ii) females.

**(1)**

A member is chosen at random.

The probability that a male member studies Latin is 

The probability that a female member studies Latin is 

(b) Work out the number of

(i) males who study Latin,

(ii) females who study Latin.

**(1)**

(c) Work out the total number of members who study Latin.

**(1)**

(d) Work out the percentage of members in the language club who study Latin.

**(2)**

**(Total for question 11 is 5 marks)**

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**\*12.** *ABCD* is a square.

*A*

*B*

*C*

*D*

*E*

*BCE* is an equilateral triangle.

(a) Work out angle *ABE*.

Give a reason.

**(1)**

(b) Work out angle *BEA*.

Give a reason.

**(1)**

(c) Work out angle *AED*.

Give a reason.

**(2)**

**(Total for question 12 is 4 marks)**

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**\*13.** There are some coloured cards in a box.

The cards are yellow or black or white or pink.

A card is selected at random from the box.

The table shows the probabilities that the card will be yellow or black or white.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Colour** | **yellow** | **black** | **white** | **pink** |
| **Probability**  | 0.32 | 0.21 | 0.27 |  |

(a) Work out the probability that it is a pink card.

**(1)**

There are 60 pink cards in the box.

(b) Work out how many cards in total are in the box.

**(1)**

(c) Work out how many yellow cards are in the box.

**(2)**

 **(Total for question 13 is 4 marks)**

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\***14.** The diagram shows a triangular patio.

*A*

*B*

*C*

*D*

*AB* = *BC*

*BD* = 15 m

The area of the patio is 120m2.

(a) (i) Work out the length of *AC*.

(ii) Work out the length of *DC*.

**(1)**

(b) (i) Work out the length of *BC*.

(ii) State the length of *AB*.

**(1)**

(c) Work out the perimeter of the patio.

**(2)**

**(Total for question 14 is 4 marks)**

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**\*15.** The diagram shows two water containers.

**Container *B***

**Container *A***

0.75 m

0.5 m

0.8 m

Container *A* is in the shape of a cube and empties at a rate of 0.016m3 per minute.

Container *B* is in the shape of a cylinder with radius 0.5 m and empties at a rate of 0.017 m3 per minute.

(a) Work out the volume of

(i) container *A*,

(ii) container *B*.

**(1)**

(b) Work out the time take for container *A* to empty.

**(1)**

(c) Work out the time take for container *B* to empty.

**(1)**

(d) Which water container, *A* or *B*, will empty the fastest?

You must give a reason

**(1)**

**(Total for question 15 is 4 marks)**

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**Foundation Problem Solving Questions – Mark schemes**

| **Qn** | **Answer** | **Mark** | **Notes** |
| --- | --- | --- | --- |
| **1 (a)** | 5 and 3 |  | process to work out the width and length of the cuboid |
| **(b)** | 4 cm | 2 | P1 process to find the height of the cuboid, e.g. 60 ÷ (3 × 5) or adding multiples of (5 × 3) to get to 60A1 4 cm |
| **2 (a)** | 8hr 78 mins or 9hr 18mins | 1  | P1 process to work out the total time for Harry,e.g. 1hr 30mins + 2hr 5mins + 2hr + 1hr 28mins + 2hr 15mins (= 8hr 78mins) |
| **(b)** | 558mins | 1 | P1 process to work out the total time for Harry in correct units, e.g. (8 × 60) + 78 (= 558mins)  |
| **(c)** | Charlotte | 1 | A1 for Charlotte with 558 |
| **3 (a)** | 0.4 | 1 | P1 process to convert  into a decimal |
| **(b)** | 1.1 | 1 | A1 1.1 oe |
| **4 (a)** | 24 | 1 | P1 process to work out the distance between B and C, e.g. 60 − (20 + 16) (= 24) |
| **(b)** | 23 | 2 | P1 process to work out the number of bushes between B and C, e.g. “24” – 1 or tally marks A1 23 |
| **5 (a)** | 4.0909 | 1 | P1 process to work out the weight of a slab in kilograms,e.g. 9 ÷ 2.2 (= 4.0909...)  |
| **(b)** | 12.22 | 1 | P1 process to work out the number of slabs Tom can carry, e.g. 50 ÷ “4.0909” (= 12.222) |
| **(c)** | 12 | 1 | A1 12 |
| **6 (a)** |  |  | process to work out the number of tins needed for one day for one dog, e.g. (+) (=) |
| **(b)** |  | 1 | P1 process to work out the number of tins needed for one day for two dogs, e.g. (+) × 2 (=) |
| **(c)** | 32 | 1 | P1 process to work out the number of tins for 12 days, e.g. 12 ×  (= 32)  |
| **(d)** | £23.04 or 2304p | 2 | P1 process to work out the total cost of the tins, e.g. “32” × 72 (= 2304) or “32” × 0.72 (23.04)A1 £23.04 or 2304p |
| **7 (a)** | 180 | 1  | P1 process to work out the cost of the prints for Infinity Printers, e.g. 150 + 30 (= 180)  |
| **(b)** | 170 | 1 | P1 process to work out the cost of the prints for Snappy Print, e.g. 120 + 50 (= 170) |
| **(c)** | Snappy Printwith reason | 1 | A1 for Snappy Print with 170 and 180 |
| **8 (a)** | £1.36 or 136p | 1 | P1 process to work out the cost of the bananas,e.g. 1.6 × 0.85 (=1.36) or 1.6 × 85 (=136)  |
| **(b)** | £1.82 or 182p | 1 | P1 process to work out the cost of the apples, e.g. 3.18 – “1.36” (= 1.82) or 318 – “136” (= 182)  |
| **(c)** | £2.60 or 260p | 2 | P1 process to work out the cost of apples per kg, e.g. “182” ÷ 0.7 (= 260) or “1.82” ÷ 0.7 (= 2.60) A1 £2.60 or 260p |
| **9 (a)** | correct equation | 1 | P1 process to equate two expressions, e.g. 5*x* – 45 = 2*x* + 15 |
| **(b)** | 20 | 1 | P1 process to solve the equation, e.g. 5*x* – 2*x* = 15 + 45 or 3*x* = 60 or *x* = 20 |
| **(c)** | *y* = 55° | 1 | A1 *y* = 55° |
| **(d)** | *z* = 125° | 1 | A1 *z* = 125° |
| **10 (a)** | 540p or £5.40 | 1 | P1 process to work out the cost of 6 bags of plums,e.g. 6 × 90 (= 540) or 6 × 0.90 (= 5.40)  |
| **(b)(i)** | 8 |  | process to work out the remaining number of plums, e.g. (50 – (7 × 6)) |
| **(b)(ii)** | 96p or £0.96 | 1 | P1 process to work out the cost of the remaining plums, e.g. (50 – (7 × 6)) × 12 (= 96) or (50 – (7 × 6)) × 0.12 (= 0.96) |
| **(c)** | 636p or £6.36 | 1 | P1 process to work out the total amount of money,e.g. “540” + “96” (= 636) or “5.40” + “0.96” (= 6.36) |
| **(d)** | 136p or £1.36 |  | process to work out the profit, e.g. 636 – 500 or 6.36 – 5.00  |
| **(e)** | 27.2% | 2 | P1 process to work out the percentage profit,e.g. [(136 ÷ 500) × 100] or [( £1.36 ÷ 5.00) × 100] A1 27.2% |
| **\*11 (a)** | 468 and 416 | 1 | P1 process to work out the number of female and male members, e.g. × 884 (= 416) or × 884 (= 468) and 884 – 416 (= 468) or 884 – 468 (= 416) |
| **(b)** | 130 and 156 | 1 | P1 process to work out the number of male and female members who study Latin, e.g. × “416” (= 130) and × “468” (= 156) |
| **(c)** | 286 | 1 | P1 process to work out the total number of members who study Latin, e.g. “130” + “156” (= 286) |
| **(d)** | 32.4% | 2 | P1 process to work out the percentage of members who study Latin, e.g. “286” ÷ 884 × 100A1 32.4% |
| **\*12 (a)** | 30° | 1 | P1 process to find the angle *ABE* with reason,e.g. 90° − 60° (= 30°) and right angle |
| **(b)** | 75° | 1 | P1 process to find the angle *BEA* with reason,e.g. (180° − “30°”) ÷ 2 (= 75°) and isosceles triangle |
| **(c)** | 150° | 2 | P1 process to find the angle *AED* with reason,e.g. 360° − “75°” – “75°” – “60°” and angles around a point add up to 360°A1 150° |
| **\*13 (a)** | 0.20 | 1 | P1 process to work out the probability of the pink card,e.g. 1 – (0.32 + 0.21 + 0.27) (= 0.20) |
| **(b)** | 300 | 1 | P1 process to work out the total number of cards,e.g. 60 ÷ “0.20” (= 300) or 60 × 5 = (300) |
| **(c)** | 96 | 2 | P1 process to work out the number of yellow cards,e.g. “300” × 0.32A1 96 |
| **\*14 (a)** | 16 m and 8 m | 1 | P1 process to work out length *AC* and length *DC* or length *AD*,e.g. 120 × 2 ÷ 15 (= 16) and [120 × 2 ÷ 15] ÷ 2 (= 8) |
| **(b)** | 17 m | 1 | P1 process to work out length *AB* and length *BC*,e.g.  (= 17)  |
| **(c)** | 50m | 2 | P1 process to work out the perimeter of the patio,e.g. “17” + “17” +”16”A1 50m |
| **\*15 (a)** | 0.521 and 0.589 | 1 | P1 process to work out the volume of container *A* and volume of container *B*, e.g. 0.8 × 0.8 × 0.8 (= 0.512) and *π* × 0.52 × 0.75 (= 0.589….) |
| **(b)** | 32 | 1 | P1 process to work out how long it takes container *A* to empty, e.g. “0.512” ÷ 0.016 (= 32) |
| **(c)** | 34.6 | 1 | P1 process to work out how long it takes container *B* to empty, e.g. “0.589(0486)” ÷ 0.017 (= 34.6…) |
| **(d)** | Container *A* with 32 **and** 34.6... or 35 | 1 | A1 container *A* with 32 **and** 34.6... or 35 |