Write your name here


Mathematics AO3
Mathematical problem solving Bronze Test

## Time: 45-60 minutes

Paper Reference
1MA1

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

## Instructions

- Use black ink or ball-point pen.
- Fill in the boxes at the top of this page with your name, centre number and candidate number.
- Answer all questions.
- Answer the questions in the spaces provided
 - there may be more space than you need.
- Calculators must not be used in questions marked with an asterisk (*).
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must show all your working out with your answer clearly identified at the end of your solution.


## Information

- This bronze test is aimed at students targeting grades 4-5.
- This bronze test has 9 questions. The total mark for this paper is 33 .
- The marks for each question are shown in brackets
- use this as a guide as to how much time to spend on each question.


## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

1. Soap powder is sold in three sizes of box.


A 2 kg box of soap powder costs $£ 1.89$
A 5 kg box of soap powder costs $£ 4.30$
A 9 kg box of soap powder costs $£ 8.46$
(a) Work out the price per kg of the 2 kg box of soap powder.
£........................per kg
(b) Work out the price per kg of the 5 kg box of soap powder.
£.
.per kg
(c) Work out the price per kg of the 9 kg box of soap powder.
£ $\qquad$ .per kg
(d) Which size of box of soap powder is the best value for money? You must show how you get your answer.
$\qquad$
*2. Gary drove from London to Sheffield.
It took him 3 hours at an average speed of $80 \mathrm{~km} / \mathrm{h}$.
(a) Work out the distance of Gary's journey from London to Sheffield.

Lyn drove from London to Sheffield.
She took 5 hours.
Assuming that Lyn
drove along the same roads as Gary and did not take a break,
(b) use your answer to part (a) to work out Lyn's average speed from London to Sheffield.
(b) If Lyn did not drive along the same roads as Gary, explain how this could affect your answer to part (a).
$\qquad$
$\qquad$
3. The first three terms of a different Fibonacci sequence are

$$
a \quad b \quad a+b
$$

(a) By adding the second and third terms, write down an expression for the fourth term of the sequence.
(b) By adding the third and fourth terms, write down an expression for the fifth term of the sequence.
(c) By adding the fourth and fifth terms, write down an expression for the sixth term of the sequence.

Given that the 3 rd term is 7 and the 6 th term is 29 ,
(d) write down an equation for the third term.
(e) Use your answers to parts (c) and (d) to form two simultaneous equations in $a$ and $b$.
(f) Solve these equations to find the value of $a$ and the value of $b$.

$$
\begin{aligned}
& a=\ldots . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . ~
\end{aligned}
$$

*4. One uranium atom has a mass of $3.95 \times 10^{-22}$ grams.
(a) Find an estimate of the mass of one uranium atom, in standard form to one significant figure.
(b) Write down the number of grams in 1 kg , in standard form.
(c) Thus work out an estimate for the number of uranium atoms in 1 kg of uranium.
(d) Is your answer to (c) an underestimate or an overestimate?

Give a reason for your answer.
$\qquad$
$\qquad$
5. Frank, Mary and Seth shared some sweets in the ratio $4: 5: 7$ Seth got 18 more sweets than Frank.
(a) Work out how many 'parts' the total sweets were shared into.
(b) Work out how many more parts Seth got than Frank.
(c) Thus work out how many sweets there are in each 'part'.
$\qquad$
(d) Thus work out the total number of sweets Frank, Mary and Seth shared.
*6. There are 1200 students at a school.
Kate is helping to organise a party.
She is going to order pizza.
Kate takes a sample of 60 of the students at the school.
She asks each student to tell her one type of pizza they want.
The table shows information about her results.

| Pizza | Number of students |
| :---: | :---: |
| ham | 20 |
| salami | 15 |
| vegetarian | 8 |
| margherita | 17 |

(a) What fraction of Kate's sample want ham pizza?
(b) Thus work out how much ham pizza Kate should order for her party.

Explain how the following assumptions could affect your answer:
(c) Not all students in the school will be attending the party.
$\qquad$
(d) The sample might be taken only from Year 9 students.
$\qquad$
(e) Every student will want one pizza.
$\qquad$
7. Henry is thinking of having a water meter .

These are the two ways he can pay for the water he uses.


Henry uses an average of 180 litres of water each day.
(a) Write down the number of days in a year.
$\qquad$
(b) Work out how many litres of water Henry uses in one year.
$\qquad$
(c) Work out how many cubic metres of water Henry uses in one year.
cubic metres
(d) Work out the cost of the water Henry uses in one year.
£. $\qquad$
(e) Use this information to determine whether or not Henry should have a water meter.
8. There are 25 boys and 32 girls in a club.
(a) Work out the total number of children in the club.
$\frac{2}{5}$ of the boys and $\frac{1}{2}$ of the girls walk to the club.
(b) Work out how many boys walk to the club.

The club leader picks at random a child from the children who walk to the club.
(c) Use your answers to parts (a) and (b) to work out the probability that this child is a boy.
9. A tin of varnish costs $£ 15$

A rectangular floor has dimensions 6 m by 11 m . The floor is going to be covered in varnish.
(a) Work out the area of the floor.
$\qquad$
$\mathrm{cm}^{2}$

Helen assumes that each tin of this varnish covers an area of $12 \mathrm{~m}^{2}$.
(b) How many tins of varnish will Helen need to cover the floor?
$\qquad$
(1)
(c) Assuming Helen can't buy a fraction of a tin, how many tins of varnish will Helen need to cover the floor?
$\qquad$
tins
(d) Using Helen's assumption, work out the cost of buying the varnish for this floor.
£. $\qquad$

Helen finds that each tin of varnish covers less than $12 \mathrm{~m}^{2}$.
(e) If Helen is correct, might she need to buy more tins or fewer tins?
$\qquad$
$\qquad$

| Mathematical problem solving: Bronze Test Grades 4-5 |  |  | Notes |  |
| :---: | :---: | :---: | :---: | :---: |
| Question | Working | Answer |  |  |
| $1$ | $\begin{aligned} & \text { £ per kg: } \\ & 1.89 \div 2=0.945(94.5) ; \\ & 4.30 \div 5=0.86(86) ; \\ & 8.46 \div 9=0.94(94) \end{aligned}$ | 5 kg(supported) | P1 | for a process (for at least two boxes) of division of price by quantity or division of quantity by price or a complete method to find price of same quantity or to find quantity of same price |
|  | kg per $£$ : $\begin{aligned} & 2 \div 1.89=1.058(2 \ldots) ; \\ & 5 \div 4.30=1.162(79 \ldots) ; \\ & 9 \div 8.46=1.0638(297 \ldots) \end{aligned}$ |  | P1 | for a complete process to give values that can be used for comparison of all 3 boxes |
|  | Price per 90 kg : $\begin{aligned} & 1.89 \times 45=85.05 \\ & 4.30 \times 18=77.4(0) \\ & 8.46 \times 10=84.6(0) \end{aligned}$ |  | C1 | for 5 kg and correct values that can be used for comparison for all 3 boxes and a comparison of their values |
| 2 |  | 48 | P1 | start to process eg. $3 \times 80(=240)$ |
|  |  |  | P1 | ${ }^{\prime} 240$ ' $\div 5$ |
|  |  |  | A1 |  |
|  |  |  | C1 | e.g. she may drive a different distance and therefore her average speed could be different |
|  | $\begin{aligned} 3 a+5 b & =29 \\ a+b & =7 \end{aligned}$ | $\begin{aligned} & a=3 \\ & b=4 \end{aligned}$ |  | Process to set up two equations |
|  | $\begin{gathered} 3 a+3 b=21 \\ b=4, a=3 \end{gathered}$ |  | P1 | Process to solve equations |
| (f) |  |  | A1 |  |



| Mathematical problem solving: Bronze Test Grades 4-5 |  |  | Notes |
| :---: | :---: | :---: | :---: |
| Question | Working | Answer |  |
| $7$ |  | Have a water meter (from working with correct figures) | P1 Process to find number of litres, e.g. $180 \div 1000$ |
|  |  |  | P1 Full process to find cost per day |
|  |  |  | P1 Full process to find total cost of water used per year (accept use of alternative time period for both options) |
|  |  |  | P1 Full process with consistent units for total cost of water |
|  |  |  | A1 Correct decision from correct figures (88.13154 or correct figure for their time period) |
| $8 \quad \text { (a }$ | $\begin{aligned} & 25 \div 5 \times 2=10 \\ & 32 \div 2=16 \\ & \frac{10}{10+16} \end{aligned}$ | $\frac{10}{26}$ | P1 Process to find number of boys walking and number of girls walking |
|  |  |  | P1 Complete process to find probability |
|  |  |  | A1 $\quad \frac{10}{26}$ oe |
| 9 |  | 90 | P1 for the process of finding an area eg. $6 \times 11(=66)$ |
|  |  |  | P1 (dependent on area calculation) for the process of working out the number of tins, e.g. " 66 " $\div 12$ (=5.5 or 6 tins) |
|  |  |  | P1 for the process of working out the cost e.g. " 6 " tins $\times £ 15$ |
|  |  |  | A1 cao |
|  |  | reason | C1 she might need to buy more tins |

