Maths SATs paper 2: reasoning

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| --- | --- | --- | --- |
| **First name** |  | | |
| **Middle name** |  | | |
| **Last name** |  | | |
| **Date of birth** | **Day** | **Month** | **Year** |
| **School name** |  | | |

**Instructions**

You **must not** use a calculator to answer any questions in this test.

**Questions and answers**

You have **40 minutes** to complete this test.

Follow the instructions for each question.

Work as quickly and as carefully as you can.

If you need to do working out, you can use the space around the question.

**Some questions have a method box like this:**

**Show your method**

For these questions, you may get a mark for showing your method.

If you cannot do a question, **go on to the next one.**

You can come back to it later, if you have time.

If you finish before the end, **go back and check your work.**

**Marks**

The number under each line at the side of the page tells you the maximum number of marks for each question.

1. **Circle the number that is 100 times greater than two hundred and seven.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2,007 | 2,070 | 20,700 | 20,070 | 2,700 |  |
|  |  |  |  |  | **1 mark** |

1. **Write these numbers in order of size, starting with the smallest**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0.9 | 0.111 | 0.099 | 0.19 |  |
|  |  |  |  |  |
| **Smallest** |  |  | **Largest** | **1 mark** |

1. The temperature in Moscow at midday was 70C. By midnight it had **fallen** by 120C.

**What was the temperature in Moscow at midnight?**

|  |
| --- |
|  |

**1 mark**

1. **Write the missing number to make this division correct.**

**91 = 9.1**

**1 mark**

1. **Examples**

|  |  |  |  |
| --- | --- | --- | --- |
| 23  2 **is less than** 3 | 5 - 4 = 3 - 2  5 - 4 is **equal** to 3 - 2 | 7 - 49 - 7  7 - 4 **is greater than** 9 - 7 |  |

Put the correct sign, or = or , into each number sentence below…

**1 mark**

|  |  |
| --- | --- |
| 1. **7 + 4 6 + 5** |  |
| 1. **0 - 2** |  |
| 1. **9 – 2 4 + 4** |  |
|  | **3 marks** |

1. **The bar chart below compares the grades achieved between boys and girls in a small year group.**

E.g. there are 14 girls and 27 boys who got a grade A.

How many **more** boys than girls were there altogether in the year group?

**2 marks**

1. **Round 7,483**

|  |  |
| --- | --- |
| to the nearest 100 |  |
| to the nearest 1,000 |  |

**2 marks**

1. **To make orange paint, you mix 7 parts yellow to 3 parts red.**

How much of each colour do you need to make **5 litres** of orange paint?

Give your answer in litres.

|  |  |
| --- | --- |
| Yellow = | litres |
| Red = | litres |

**2 marks**

1. **Here are a list of numbers:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **-8** | **-6** | **-4** | **-2** | **0** | **1** | **3** | **5** |

You can choose some of the numbers from the list and add them to find their **total**.

|  |  |
| --- | --- |
| **For example,** | **5 + -2 = 3** |

1. Choose **two** different numbers from the list which also have a **total** of 3

+ = **3**

**1 mark**

1. Choose two of the numbers from the list which have a total of -1

+ = **- 1**

**1 mark**

1. **The four compass points N, S, E and W are shown.**

|  |  |  |
| --- | --- | --- |
| 1. Julie is facing **South**.   She turns **clockwise** through **2 right angles.**  Which direction is she facing now? | W | 1 mark |
| 1. Joseph turned **clockwise** through **3 right angles.**   He ended up facing **North**.  Which direction was he facing **before** the turn. |  | 1 mark |

1. **The first day of April 2017 was a Saturday.**

|  |  |  |
| --- | --- | --- |
| 1. **What day of the week did 24 April fall?** | | |
|  |  |  |
|  |  | **1 mark** |
| 1. **How many Saturdays were there altogether in April 2017?** | | |
|  |  |  |
|  |  | **1 mark** |

1. **You are given the following square grid to help you.**

|  |  |  |  |
| --- | --- | --- | --- |
| A parallelogram has corners **PQRS**.  Three of them have the following coordinates | | **5**  **4**  **3**  **2**  **1**  **-1**  **-2**  **-3**  **-4**  **-5**  **1 2 3 4 5**  **-5 -4 -3 -2 -1** | |
| **P** = (-1, 0); **Q** = (2, 0) & **S** = (1, 3) | |
| Write down two possible sets of coordinates for the fourth point R. | | | |
| **First point =** | **( , )** | **Second point =** | **( , )** |
|  |  |  | **2 marks** |

1. **Here is a sketch representing a vegetable patch in a garden**

|  |
| --- |
|  |

Ari plants  of the vegetable patch with **carrots**.

1. Draw a **straight** **line** to show how much of the patch is for carrots.

**Shade** in the area for carrots. 1 mark

**1 mark**

1. The rest of the patch is to be shared equally between **turnips** and **onions**.

What fraction is to be used for **turnips**?

**1 mark**

1. **Match these cards into three sets that show the same number.**

|  |
| --- |
| 0.4  40%  15%  0.25  25%  20%  0.2 |
| Set 1 = = = |
| Set 2 = = = |
| Set 3 = = = |
| **3 marks** |

1. **Write down the scale reading indicated by the arrow below:**

|  |  |
| --- | --- |
| -10  0 | 40  20  **2 marks** |

1. **A sequence uses the following ‘term to term’ rule**

***“Divide the previous term by 2, then add 1”***

E.g. Starting with ‘10’, we would get … 10 ÷ 2 = 5,

then 5 + 1 = 6…

1. Starting with the number 10, write down the **five** terms in this sequence [the first two are given].

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Answer:** | **10,** | **6,** | , | , | , |

**1 mark**

1. Explain what would eventually happen if you were to continue this process?

|  |
| --- |
|  |

**1 mark**

1. **Complete the following function machines with a number and any missing operations to make each total.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. 12 |  |  |  | 6 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1. 4 |  | x |  |  |  | 18 |

**2 marks**

1. A pupil recorded the height of rain water they collected in a bottle over five different months

|  |  |
| --- | --- |
|  | Amount in cm |
| February | 0.3 |
| March | 0.5 |
| April | 0.9 |
| May | 0.35 |
| June | 0.05 |

**1 mark**

1. Fill in the gaps with the correct month

|  |  |
| --- | --- |
| The **most** rain fell in |  |
| The **least** rain fell in |  |

**2 marks**

1. How much **more** rain fell in April than in May?

Write your answer in **millimetres.**

|  |
| --- |
|  |

1. **marks**
2. Here is a drawing of a net. When it is folded along the dotted lines it makes a cube.

|  |
| --- |
| **T**  **A** |

1. Write the letter **B** on the face that is **opposite** the face with the letter **A** in it

**1 mark**

1. Place the letter **S** on the edge that would join on to the edge marked with the letter **T**

**1 mark**

1. The **mean** of three numbers is seven. Two of the numbers are given below. Write down the third number.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 |  | 4 |  |  |

**2 marks**

1. Mr. Silver decides to promote the sale of Easter eggs in his shop. He displays two offers below:

|  |  |  |
| --- | --- | --- |
| **a** |  | **b** |
| Normal Price = £4 |  | Normal Price = £4 |
| Now 25% **off**. |  | Now buy **2** get third **free**. |

Adrian enters the shop and would like to buy as many Easter eggs as possible. He has £20 to spend. Choose which offer he should go for and explain why.

**4 marks**

1. The shaded cross-shape, **R,** has an **area** of **5cm2** and a perimeter of **12cm**.

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1. Draw a shape with an **area** of **4cm2.** Label it **A**.

What is its **perimeter**?

**Perimeter =**

**1 mark**

1. Draw a shape where the **area** is **greater** than its **perimeter**

Label it **B.**

**1 mark**

1. One of the angles of an **isosceles** **triangle** is 40˚. Can you find the missing angles of two **different** isoscele triangles.

|  |  |  |  |
| --- | --- | --- | --- |
| **Triangle 1:** | 40˚, | ˚, | ˚, |
| **Triangle 2:** | 40˚, | ˚, | ˚, |

**1 mark**

1. Two numbers are linked by the following **equation**

**a** + 2**b** = 20

**1 mark**

1. If **b** = 7, what is the value of **a**
2. =

**1 mark**

1. If **a** = 12, what is the value of **b**
2. =

**1 mark**

**Answers**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Qu.** | **Answers** | **Mark** | | **Additional Guidance** |
| **1.** | 20,700 | **1** |  | |
| **2.** | 0.099, 0.111, 0.19, 0.9 | **1** |  | |
| **3.** | -50C | **1** |  | |
| **4.** | 10 | **1** |  | |
| **5.** | 1. = | **1**  **1**  **1** |  | |
| **6.** | 65 girls and 72 boys  72 - 65 = 7 more boys | **1**  **1** | Accept either correct answer  Follow their answers provided the totals are boys girls | |
| **7.** | 7,500  7,000 | **1**  **1** |  | |
| **8.** | Yellow = 3.5 l; red = 1.5 l | **2** | For 1 mark, accept any two numbers that add to 5 provided Y R | |
| **9.** | (a) **0** + **3** = **3** or **3** + 0= 3  (b) **1** + **-2** = **-1** or **3** + **-4** = **-1** or **5** + **-6** = **-1.** | **1**  **1** | Accept any order  Accept any order | |
| **10.** | North  East | **1**  **1** | Accept N and E for both marks. | |
| **11.** | Monday  5 | **1**  **1** |  | |
| **12.** | (-2, 3); (4, 3); (0, -3) | **1+1** | 1 mark for each correct apir of coordinates | |
| **13.** | Shade in any ‘four parts’ | **1**  **1** | E.g.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | | |

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| **14.** | Set 1: 20% = 0.2 =  Set 2: 25% = 0.25 =  Set 1: 40% = 0.4 = | **1**  **1**  **1** | Any order but must match |
| **15.** | 4  45 | **1**  **1** |  |
| **16.** | 10, 6, **4**, **3**, **2.5**…  Eventually it gets closer to **1** | **1**  **1** | ‘Ends at 1’, sight of ‘1’ |

|  |  |  |  |
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| **17.** | **a.** Either ‘-6’ or ‘÷2’  **b.**  ‘×1 + 14’; ‘×2 + 10’; ‘×3 + 6’  ‘×4 + 2’; ‘×5 - 2’; ‘×6 - 6’ | **1**  **1** | Accept words such as ‘divide by 2’, ‘halve’, ‘half it’  Others exist as long as the first operation is multiply. |
| **18.** | Most = April  Least = June  0.9 - 0.35 = 0.55 cm  0.55 × 10= 5.5 mm | **1**  **1**  **1**  **1** | Follow their ‘difference’ for answer in millimetres. |
| **19.** | **a.**  **T**  **A**  **B**  **b.**  **T**  **A**  **S** | **1**  **1** | Any indication will be accepted e.g. a tick, a cross, shading etc. |
| **20.** | 13 | **2** | Allow 1 for sight of a total of 21 |

|  |  |  |  |
| --- | --- | --- | --- |
| **21.** | **a:** 25% of £4 = £1.  New price = £4 - £1 = **£3**  £20 ÷ £3 = 6r2 … **6 eggs**  **b:** £4 + £4 + £0;  £4 + £4 + £0; … 6 eggs  £4 … £20 spent **7eggs** | **1**  **1**  **1**  **1** | Accept **a** = 6eggs & **b** = 7eggs  without decision for 4marks  Ignore £2 change.  If final answer is incorrect or incomplete, then allow 2 marks for **a** = 6 or **b** 7 eggs |
| **22.** | 1. Perimeter = 10cm   Perimeter =10cm  Perimeter = 8cm  A = 24cm2  P = 20cm | **1**  **1** | Various shapes. Do not accept triangles  All variations with 3 squares in a line have perimeter = 10  Any square with a side length greater than 4cm. Other rectangles: 5x4; 6x5; 7x3; 7x4; 7x5; 7x6; 8x3(+)… |
| **23.** | **Triangle 1:** 400, **40**0, **100**0  **Triangle 2:** 400, **70**0, **70**0 | **1**  **1** |  |
| **24.** | **a** = 6  **b** = 4 | **1**  **1** | 20 - 2x7  (20 - 12) ÷ 2 |
| **Total = 50 marks** | | | |