Maths Predicted Paper

Higher Paper 2 Calculator

**Q1.** Circle the decimal that is closest in value to 

0.6                            0.66                            0.667                            0.67

**(Total 1 mark)**

**Q2.** Increase 4200 by 38%

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**(Total 2 marks)**

**Q3.**

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



How many centimetre cubes were used to make the cuboid?

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Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(Total 2 marks)**

**Q4.**

Here is

a rectangle

and

a T-shape made from two rectangles.



Show that the rectangle and the T-shape have the same area.

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**(Total 4 marks)**

**Q5.** Here is a quadratic graph.



Circle the *x*-coordinate of the turning point of the graph.

–4       –1       1       3 **(Total 1 mark)**

**Q6.**

(a)     Line *M* has the equation     3*x* + 2*y* = 7 Circle the gradient of line *M*.

  **(1)**

(b)     Line *N* has the equation     

Circle the gradient of a line that is **perpendicular** to line *N*.

  **(1)**

**(Total 2 marks)**

**Q7.** The equation of a curve is  *y* = (*x* + 3)2 + 5 Circle the coordinates of the turning point.

(5, 3)       (5, −3)       (3, 5)       (−3, 5)

**(Total 1 mark)**

**Q8.**

(a)     Factorise     *x*2 + 10*x* + 24

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Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

(b)     Hence or otherwise,     solve *x*2 + 10*x* + 24 = 0

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Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

**(Total 3 marks)**

**Q9.** A biased coin is thrown 250 times.

The relative frequency of Heads is worked out after every 50 throws.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Total number of throws** | 50 | 100 | 150 | 200 | 250 |
| **Relative frequency** | 0.4 | 0.29 | 0.4 | 0.32 | 0.3 |

Circle the best estimate of the probability of Heads.

0.3        0.32        0.342        0.4 **(Total 1 mark)**

**Q10.**

 Circle the value of the reciprocal of 0.2



**(Total 1 mark)**

**Q11.**

Circle the inequality shown by the diagram.



−7 < *x* < 6                  −7 ≤ *x* < 6                  −7 < *x* ≤ 6                  −7 ≤ *x* ≤ 6

**(Total 1 mark)**

**Q12.** The diagram shows a rectangle.



(a)     Write down an expression for the **area** of the rectangle. Simplify your answer.

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Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(2)**

(b)     You are given that *a* and *b* are prime numbers. The **area** of the rectangle is 315 cm2

Work out the values of *a* and *b*.

Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cm    and    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cm **(2)**

**(Total 4 marks)**

**Q13.**

The dimensions of a rectangular floor are to the nearest 0.1 metres.



A force of 345 Newtons is applied to the floor. The force is to the nearest 5 Newtons.

|  |
| --- |
|   |

Work out the upper bound of the pressure. Give your answer to 4 significant figures.

You **must** show your working.

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Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ N/m2  **(Total 5 marks)**

**Q14.**

The square of *x* is 7

Circle the value of *x*3

343                                                     117 649                           

**(Total 1 mark)**

**Q15.**

 where *x* > 0     and      where *y* > 0

Work out the value of .

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**(Total 5 marks)**

**Q16.** The diagram shows a square with area 100 cm2

Not drawn accurately



Work out the values of *x* and *y*.

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 *x* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*y* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **(Total 6 marks)**

**Q17.** Solve the following equations.Do **not** use trial and improvement.

(a)      + 2 = *x*

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*x* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(3)**

(b)     

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*y* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(4)**

**(Total 7 marks)**

**Q18.** The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

*AC* = 17 cm *BC* = 8 cm

Not drawn accurately



*BC* : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

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Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cm2  **(Total 4 marks)**

**Q19.**

Rana sells 192 cakes in the ratio  small : medium : large  =  7 : 6 : 11

The profit for one medium cake is twice the profit for one small cake.

The profit for one large cake is three times the profit for one small cake.

Her total profit is £532.48

Work out the profit for one small cake.

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Answer £ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(Total 5 marks)**

**Q20.**

f(*x*) = 3*x*

Circle the expression for f–1(*x*)



**(Total 1 mark)**

**Q21.**

*ABCD* and *AEFG* are identical squares.
*CD* = *EF* = 10 cm
Angle *BAG* = 45°

Not drawn accurately



Prove that triangles *AGD* and *ABE* are congruent.

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**(Total 4 marks)**

**Q22.**

A fishing lake contains thousands of fish.

The fish are Carp, Bream or Roach.

10 fish are caught.

The table shows some of the results.

|  |  |  |  |
| --- | --- | --- | --- |
|   | **Carp** | **Bream** | **Roach** |
| **Frequency** | 4 |   |   |
| **Relative frequency** |   | 0.1 |   |

(a)     Complete the table.

**(3)**

(b)     The owner uses the results to estimate the proportion of Carp in the lake.

How can she make her estimate more reliable?

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**(1)**

**(Total 4 marks)**

**Q23.**

Solids X and Y are similar.

X has volume 64 cm3

Y has volume 343 cm3

The surface area of X is 176 cm2

Work out the surface area of Y.

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Answer = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cm2

**(Total 3 marks)**

**Q24.** (3*x* + 1)(*x* − 2) + *ax* + *b* ≡ 3*x*2 + 8*x* − 5

Work out the values of *a* and *b*.

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*a* =....................................................................

*b* =....................................................................

**(Total 4 marks)**

**Q25.**

(a)    Factorise         3*n*2 + 7*n* + 4

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Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

(b)     Hence, or otherwise, write 374 as the product of its prime factors.

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Answer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

**(Total 4 marks)**

**Q26.**

The diagram shows a sphere, radius 6 cm, and a solid hemisphere, radius 9 cm



Work out the ratio

surface area of the sphere  :  **total** surface area of the hemisphere

Give your answer in its simplest form.

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Answer \_\_\_\_\_\_\_ : \_\_\_\_\_\_\_

**(Total 5 marks)**

**Q27.**

(a)     What is the equation of a circle with centre (0, 0) and diameter 6 units?

Circle your answer.

*x*2 + *y*2 = 3                  *x*2 + *y*2 = 6                  *x*2 + *y*2 = 9                  x2 + *y*2 = 36

**(1)**

(b)     Which of these points lie on the circumference of the circle     *x*2 + *y*2 = 25?

Circle your answer.

(−3, 4)                  (6.25, 6.25)                  (9, 16)                  (−1, 12)

**(1)**

(c)     Circle True (T) or False (F) for each statement.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | The centre of the circle *x*2 + *y*2 = 25 is (0, 0) |   | T | F |
| The equation of the tangent to the circle *x*2 + *y*2 = 25 at the point (5, 0) is *y* = 5 |   | T | F |
| The equation of a circle and the equation of a straight line can have 0, 1 or 2 solutions if solved simultaneously |   | T | F |

**(2)**

**(Total 4 marks)**

**Q28.**

(a)  Write *x*(3*x* – 9) = 4  in the form  *ax*2 + *bx* + *c* = 0  where *a*, *b* and *c* are integers.

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Answer\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(1)**

(b)  Solve   *x*(3*x* – 9) = 4

Give your answers to 2 decimal places.

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Answer\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(2)**

**(Total 3 marks)**