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**Answer ALL TWENTY SIX questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1** Show that 

**(Total for Question 1 is 3 marks)**

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**2** Change a speed of 90 kilometres per hour to a speed in metres per second.

Show your working clearly.

...................................................... m/s

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

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**3 ℰ** = {11, 12, 13, 14, 15, 16, 17, 18, 19, 20}

*A* = {even numbers}

*A* ∩ *B* = {12, 16, 20}

(*A* ∪ *B*)ʹ = {17, 19}

Complete the Venn diagram for the sets **ℰ**, *A* and *B*

**

**(Total for Question 3 is 3 marks)**

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**4** The diagram shows rectangle *ABCD*

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Work out the perimeter of the rectangle.

Show your working clearly.

...................................................... cm

**(Total for Question 4 is 4 marks)**

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**5** The weight of a cake is 2.75 kg, correct to 2 decimal places.

(*a*)Write down the lower bound of the weight of the cake.

...................................................... kg

**(1)**

(*b*)Write down the upper bound of the weight of the cake.

...................................................... kg

**(1)**

Penny has worked out .

Her answer is 13 332.299 17

Penny’s answer is not sensible.

(*c*)By rounding each number to one significant figure, work out a suitable estimate to

show that her answer is not sensible.

Show your working clearly.

**(2)**

**(Total for Question 5 is 4 marks)**

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**6** The points *A* and *B* are on a coordinate grid.

The coordinates of *A* are (6, 4)

The coordinates of *B* are (17, *j*) where *j* is a constant.

The midpoint of *AB* has coordinates (*k*, 15) where *k* is a constant.

Find the value of *j* and the value of *k*

*j* = ......................................................

*k* = ......................................................

**(Total for Question 6 is 3 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**7** Solve the simultaneous equations

5*x* + 4*y* = –2

2*x* – *y* = 4.4

Show clear algebraic working.

*x* = ......................................................

*y* = ......................................................

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

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**8** Matteo is going to invest 5000 Swiss francs for two years.

He can invest his money in Bank **G** or in Bank **H**.



The total amount of interest Matteo would receive at the end of two years from

Bank **G** is more than the amount of interest Matteo would receive at the end of

two years from Bank **H**.

How much more?

...................................................... Swiss francs

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

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**9** (*a*)Write down the value of (*m* + 2)0 where *m* is a positive integer.

......................................................

**(1)**

(*b*)Simplify (3*a*2*b*4)3

......................................................

**(2)**

(*c*)Factorise fully 14*x*2 *y*4 + 21*x*3 *y*2

..................................................................................

**(2)**

The diagram shows a straight line drawn on a grid.



(*d*)Write down an equation of the line.

..................................................................................

**(2)**

**(Total for Question 9 is 7 marks)**

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**10** The diagram shows an isosceles triangle, with base length 24 cm.



The perimeter of the triangle is 54 cm.

Work out the area of the triangle.

...................................................... cm2

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

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**11** Here are six graphs.



Complete the table below with the letter of the graph that could represent each

given equation.

Write your answers on the dotted lines.

|  |  |
| --- | --- |
| **Equation** | **Graph** |
|  | ..................... |
| *y* = 5 – *x*2 | ..................... |
| *y* = –2*x*3 | ..................... |

**(Total for Question 11 is 3 marks)**

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**12** The cumulative frequency graph gives information about the time, in minutes, each of

60 people took to shop in a market.



(*a*)Use the graph to find an estimate for the median time people took to shop in

the market.

...................................................... minutes

**(1)**

(*b*)Use the graph to find an estimate for the number of people who took longer than

55 minutes to shop in the market.

......................................................

**(2)**

(*c*)Use the graph to complete the frequency table to give information about the time,

in minutes, each of the 60 people took to shop in the market.

|  |  |
| --- | --- |
| **Time taken to shop in the market****(*m* minutes)** | **Frequency** |
| 0 < *m* ≤ 10 | 3 |
| 10 < *m* ≤ 20 | 5 |
| 20 < *m* ≤ 30 |  |
| 30 < *m* ≤ 40 |  |
| 40 < *m* ≤ 50 |  |
| 50 < *m* ≤ 60 |  |
| 60 < *m* ≤ 70 |  |

**(2)**

**(Total for Question 12 is 5 marks)**

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**13** Solve 

Show clear algebraic working.

*x* = ......................................................

**(Total for Question 13 is 3 marks)**

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**14** *A*, *B*, *C* and *D* are points on a circle, centre *O*

*EBF* is the tangent to the circle at *B*



(*a*)(i) Work out the size of angle *DCB*

......................................................°

**(1)**

(ii) Give a reason for your answer to (*a*)(i)

......................................................................................................................................................

......................................................................................................................................................

**(1)**

(*b*)Work out the size of angle *ADO*

......................................................°

**(3)**

**(Total for Question 14 is 5 marks)**

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**15** Here is a list giving the numbers of runs scored last week by the eleven members of

cricket team **A**.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2 | 3 | 4 | 6 | 21 | 26 | 27 | 32 | 34 | 61 | 72 |

The interquartile range of the numbers of runs scored last week by the eleven members

of cricket team **B** was 42

Using a suitable calculation, write down one comparison between the numbers of runs

scored by the members of cricket team **A** and the members of cricket team **B**.

Show your working clearly.

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**(Total for Question 15 is 3 marks)**

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**16** Use algebra to show that 

**(Total for Question 16 is 2 marks)**

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**17** Given that 

where *k* is an integer and *m* is a prime number,

(*a*)work out the value of *k*

*k* = ......................................................

**(1)**

(*b*)Show that  can be written in the form 

where *a* and *b* are integers.

Show each stage of your working clearly.

**(3)**

**(Total for Question 17 is 4 marks)**

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**18** The table gives information about the weights, in kg, of the parcels that Pedro delivers

on Monday.

|  |  |
| --- | --- |
| **Weight (*w* kg)** | **Frequency** |
| 0 < *w* ≤ 2 | 12 |
| 2 < *w* ≤ 3 | 7 |
| 3 < *w* ≤ 6 | 15 |
| 6 < *w* ≤ 9 | 12 |
| 9 < *w* ≤ 14 | 9 |

(*a*)On the grid, draw a histogram for this information.

****

**(3)**

One of the parcels that Pedro delivered on Monday is chosen at random.

(*b*)Using the information in the table, find an estimate for the probability that this

parcel weighs more than 7 kg.

......................................................

**(2)**

**(Total for Question 18 is 5 marks)**

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**19 A** and **B** are two similar vases.



The vases are such that

surface area of vase **B** =  surface area of vase **A**

and that

volume of vase **A** – volume of vase **B** = 541.8 cm3

Calculate the volume of vase **B**

...................................................... cm3

**(Total for Question 19 is 4 marks)**

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**20** Solve the simultaneous equations

*y* = 7 – 2*x*

*x*2 + *y*2 = 34

Show clear algebraic working.

..........................................................................................................................

**(Total for Question 20 is 5 marks)**

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**21** Given that the surface area of a sphere is 49*π* cm2

find the volume of the sphere.

Give your answer correct to the nearest integer.

...................................................... cm3

**(Total for Question 21 is 3 marks)**

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**22** Solve the inequality 6*x*2 + 37*x* ≤ 35

Show clear algebraic working.

..................................................................................

**(Total for Question 22 is 3 marks)**

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**23** The diagram shows a solid prism *ABCDEFGHIJ*

**

The prism is such that each cross section is a pentagon where

*AE* = *BC* = *x* cm *AB* = 2*x* cm *ED* = *CD* = 8 cm

angle *EAB* = angle *CBA* = 90° angle *AED* = angle *BCD* = 120°

Given that *AG* = *BH* = *EF* = *DJ* = *CI* = 12 cm

calculate the angle that *AJ* makes with the base *ABHG* of the prism.

Give your answer correct to 3 significant figures.

......................................................°

**(Total for Question 23 is 5 marks)**

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**24** The graph of *y* = *a* sin *x*° + *b* is drawn on the grid.

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Find the value of *a* and the value of *b*

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

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

**(Total for Question 24 is 2 marks)**

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**25** The function f is such that f(*x*) = 3*x*2 – 12*x* + 7 where *x* ≤ 2

Express the inverse function f –1 in the form f –1(*x*) = …

f –1(*x*) = ......................................................

**(Total for Question 25 is 4 marks)**

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**26** Find the values of *n* such that



Show clear algebraic working.

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**(Total for Question 26 is 5 marks)**

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**TOTAL FOR PAPER IS 100 MARKS**