Text

Description automatically generated

**Diagram, shape, polygon

Description automatically generated**

**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)**

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

**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)**

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

**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*

*Diagram, venn diagram

Description automatically generated*

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

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

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

*Shape

Description automatically generated with medium confidence*

Work out the perimeter of the rectangle.

Show your working clearly.

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

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

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

**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)**

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

**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**.

Graphical user interface

Description automatically generated with medium confidence

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)**

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

**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.

Chart, line chart

Description automatically generated

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

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

**(2)**

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

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

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

Shape, polygon

Description automatically generated

The perimeter of the triangle is 54 cm.

Work out the area of the triangle.

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

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

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

**11** Here are six graphs.

Diagram

Description automatically generated

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)**

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

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

60 people took to shop in a market.

Chart, line chart

Description automatically generated

(*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)**

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

**13** Solve 

Show clear algebraic working.

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

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

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

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

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

Diagram

Description automatically generated

(*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)**

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

**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.

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

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

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

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

**16** Use algebra to show that 

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

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

**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)**

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

**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.

**Chart

Description automatically generated**

**(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)**

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

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

A picture containing shape

Description automatically generated

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)**

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

**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)**

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

**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*

*Diagram

Description automatically generated*

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)**

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

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

*Chart, line chart

Description automatically generated*

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

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

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

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

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

**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)**

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

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



Show clear algebraic working.

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

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

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**TOTAL FOR PAPER IS 100 MARKS**