Number
2002 - 2011

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1 Use your calculator to find $\sqrt{\dfrac{45 \times 5.75}{3.1 + 1.5}}$.

Answer .... [2]

---

2 Work out $2(3 \times 10^8 - 4 \times 10^6)$, giving your answer in standard form.

Answer .... [2]

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3 Write the following in order of size, **largest** first.

$\sin 158°$ $\cos 158°$ $\cos 38°$ $\sin 38°$

Answer .... > .... > .... > .... [2]

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4 Write down all the working to show that $\dfrac{\dfrac{3}{5} + \dfrac{2}{3}}{\dfrac{3}{5} \times \dfrac{2}{3}} = 3\dfrac{1}{6}$.

Answer

[3]

5 A circle has a radius of 50 cm.

(a) Calculate the area of the circle in cm².

Answer(a) .... cm² [2]

(b) Write your answer to **part (a)** in m².

Answer(b) .... m² [1]

Answer .... [3]

1   A bus leaves a port every 15 minutes, starting at 09 00.
     The last bus leaves at 17 30.

     How many times does a bus leave the port during one day?

                                                    Answer .... [2]

3   Use your calculator to find the value of

     (a) $3^0 \times 2.5^2$,

                                                    Answer(a) .... [1]

     (b) 2.5^{-2}.

                                                    Answer(b) .... [1]

4   The cost of making a chair is \$28 correct to the nearest dollar.

     Calculate the lower and upper bounds for the cost of making 450 chairs.

                                       Answer lower bound \$ ....

                                                upper bound \$ .... [2]

5 Jiwan incorrectly wrote $1 + \dfrac{1}{2} + \dfrac{1}{3} + \dfrac{1}{4} = 1\dfrac{3}{9}$.

Show the correct working and write down the answer as a mixed number.

Answer .... [3]

6 The force, F, between two magnets varies **inversely** as the **square** of the distance, d, between them.

$F = 150$ when $d = 2$.

Calculate F when $d = 4$.

Answer F = ... [3]

11 Find the values of m and n.

(a) $2^m = 0.125$

Answer(a) m = ... [2]

(b) $2^{4n} \times 2^{2n} = 512$

Answer(b) n = ... [2]

1   Martha divides $240 between spending and saving in the ratio

spending : saving = 7 : 8.

Calculate the amount Martha has for spending.

Answer $ .... [2]

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2   210   211   212   213   214   215   216

From the list of numbers, find

(a) a prime number,

Answer(a) .... [1]

(b) a cube number.

Answer(b) .... [1]

---

3   Solve the simultaneous equations.
$$x + 5y = 22$$
$$x + 3y = 12$$

Answer x = ...

y = ... [2]

---

4 Find the value of $\left(\dfrac{27}{8}\right)^{-\frac{4}{3}}$.

Give your answer as an exact fraction.

Answer .... [2]

---

5 The population of a city is 128 000, correct to the nearest thousand.

(a) Write 128 000 in standard form.

Answer(a) .... [1]

(b) Write down the upper bound of the population.

Answer(b) .... [1]

---

6 Pedro invested $800 at a rate of 5% per year **compound** interest.
Calculate the **total** amount he has after 2 years.

Answer $ .... [2]

---

7 Show that $3^{-2} + 2^{-2} = \dfrac{13}{36}$.

Write down all the steps of your working.

Answer

[2]

4

8 Find the value of $\dfrac{\sqrt[3]{17.1-1.89}}{10.4+\sqrt{8.36}}$.

Answer .... [2]

9 In Vienna, the mid-day temperatures, in °C, are recorded during a week in December.
This information is shown below.

$$-2 \quad 2 \quad 1 \quad -3 \quad -1 \quad -2 \quad 0$$

Calculate

(a) the difference between the highest temperature and the lowest temperature,

Answer(a) .... °C [1]

(b) the mean temperature.

Answer(b) .... °C [2]

10 Maria decides to increase her homework time of 8 hours per week by 15%.

Calculate her new homework time.
Give your answer in hours and minutes.

Answer .... h .... min [3]

12 Alberto changes 800 Argentine pesos (ARS) into dollars ($) when the rate is $1 = 3.8235 ARS.
He spends $150 and changes the remaining dollars back into pesos when the rate is
$1 = 3.8025 ARS.

Calculate the amount Alberto now has in pesos.

Answer .... ARS [3]

13 During a marathon race an athlete loses 2% of his mass.
At the end of the race his mass is 67.13 kg.

Calculate his mass before the race.

Answer .... kg [3]

1 **(a)** Abdullah and Jasmine bought a car for $9000.
Abdullah paid 45% of the $9000 and Jasmine paid the rest.

(i) How much did Jasmine pay towards the cost of the car?

Answer(a)(i) $ .... [2]

(ii) Write down the ratio of the payments   Abdullah : Jasmine   in its simplest form.

Answer(a)(ii) .... : .... [1]

(b) Last year it cost $2256 to run the car.
Abdullah, Jasmine and their son Henri share this cost in the ratio 8 : 3 : 1.
Calculate the amount each paid to run the car.

Answer(b) Abdullah $ ....

Jasmine $ ....
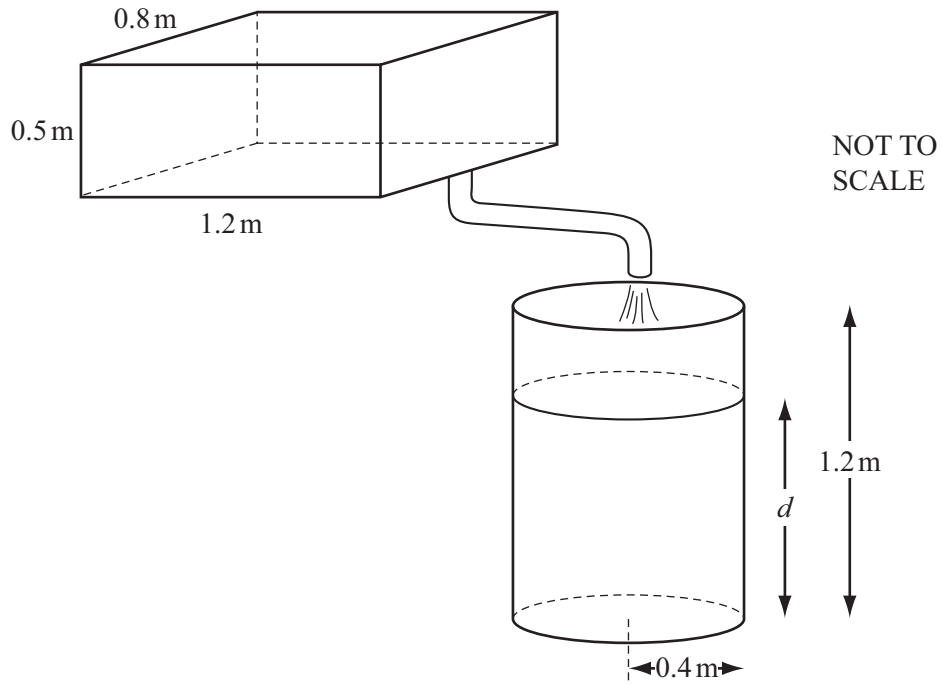
Henri $ .... [3]

(c) **(i)** A new truck costs $15 000 and loses 23% of its value **each year**.
Calculate the value of the truck after three years.

Answer(c)(i) $ .... [3]

(ii) Calculate the overall percentage loss of the truck's value after three years.

Answer(c)(ii) .... %[3]

1

0.8 m

0.5 m

1.2 m

NOT TO
SCALE

1.2 m

d

0.4 m

A rectangular tank measures 1.2 m by 0.8 m by 0.5 m.

(a) Water flows from the full tank into a cylinder at a rate of 0.3 m^3/min.

Calculate the time it takes for the full tank to empty.
Give your answer in minutes and seconds.

Answer(a) .... min .... s [3]

1 Javed says that his eyes will blink 415 000 000 times in 79 years.

    (a) Write 415 000 000 in standard form.

<p align="center">*Answer (a)* ....   [1]</p>

    (b) One year is approximately 526 000 minutes.
        Calculate, correct to the nearest whole number, the average number of times his eyes will blink
        per minute.

<p align="center">*Answer (b)* ....   [1]</p>

---

2 Luis and Hans both have their birthdays on January 1st.
    In 2002 Luis is 13 and Hans is 17 years old.

    (a) Which is the next **year** after 2002 when both their ages will be prime numbers?

<p align="center">*Answer (a)* ....   [1]</p>

    (b) In which **year** was Hans twice as old as Luis?

<p align="center">*Answer (b)* ....   [1]</p>

---

7 The temperature decreases from 25 °C to 22 °C.
Calculate the percentage decrease.

Answer .... % [2]

9 Elena has eight rods each of length 10 cm, correct to the nearest centimetre.
She places them in the shape of a rectangle, three rods long and one rod wide.

NOT TO
SCALE

(a) Write down the minimum length of her rectangle.

Answer (a) .... cm [1]

(b) Calculate the minimum area of her rectangle.

Answer (b) .... cm^2 [1]

5

10 Mona made a model of a building using a scale of 1:20.
The roof of the building had an area of 300 m².

   (a) Calculate the area of the roof of the model in square metres.

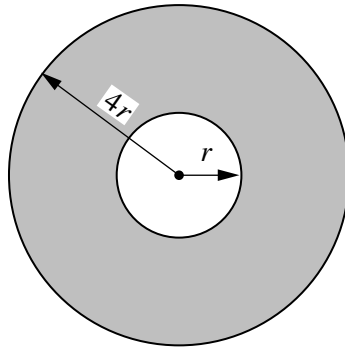*Answer (a)* .... m²   [2]

   (b) Write your answer in square centimetres.

Answer (b) .... cm²   [1]

17

NOT TO
SCALE

Two circles have radii *r* cm and 4*r* cm.
Find, in terms of π and *r*.

(a) the area of the circle with radius 4*r* cm,

Answer (a) .... cm² [1]

(b) the area of the shaded ring,

Answer (b) .... cm² [1]

(c) the total length of the inner and outer edges of the shaded ring.

Answer (c) .... cm [2]

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18 (a) Omar changed 800 rands into dollars when the rate was $1 = 6.25 rands.

    (i) How many dollars did Omar receive?

Answer (a)(i) $ .... [1]

    (ii) Three months later he changed his dollars back into rands when the rate was
$1 = 6.45 rands. How many **extra** rands did he receive?

Answer (a)(ii) .... rands [1]

(b) Omar's brother invested 800 rands for three months at a simple interest rate of 12% per year.
How much interest did he receive?

Answer (b) .... rands [2]

1 **(a)** One day Amit works from 08 00 until 17 00.
The time he spends on filing, computing, writing and having lunch is in the ratio

Filing: Computing: Writing: Lunch = 2: 5 : 4 : 1.

Calculate the time he spends

 **(i)** writing, [1]

  (ii) having lunch, giving this answer in minutes. [1]

 (b) The amount earned by Amit, Bernard and Chris is in the ratio 2 : 5 : 3.
Bernard earns $855 per week.
Calculate how much

  (i) Amit earns each week, [1]

  (ii) Chris earns each week. [1]

 (c) After 52 weeks Bernard has saved $2964.
What fraction of his earnings has he saved?
Give your answer in its lowest terms. [2]

 (d) Chris saves $3500 this year. This is 40% more than he saved last year.
Calculate how much he saved last year. [3]

1   Write in order of size, smallest first,

$$\frac{5}{98}, \quad 0.049, \quad 5\%.$$

Answer ....<.............<.................. [2]

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2   The graph below can be used to convert between euros (€) and pounds (£).
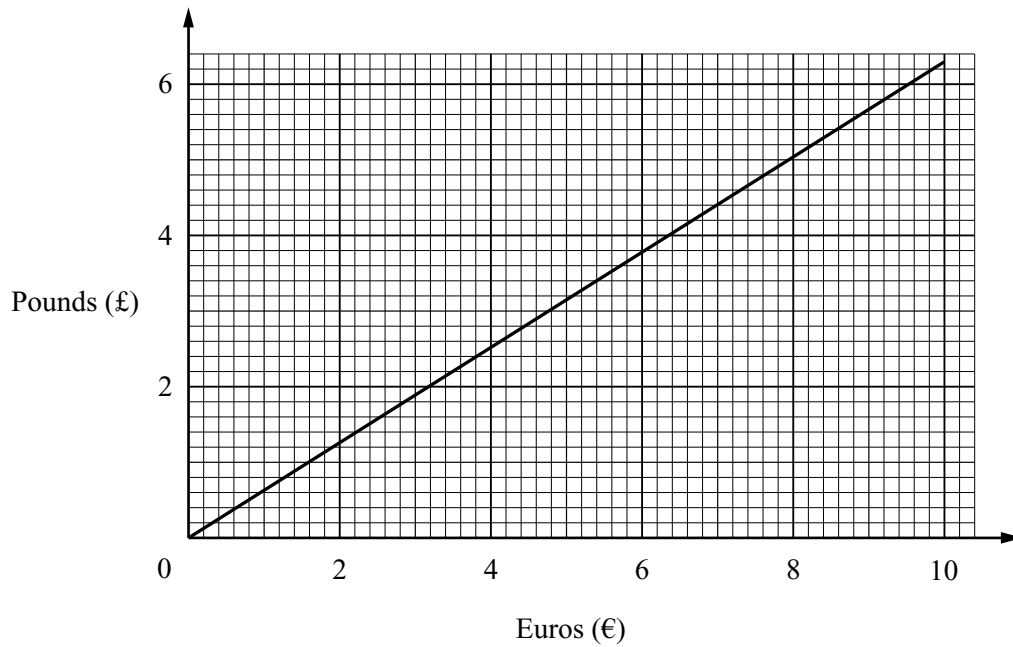
(a) Change £5 into euros.

Answer (a) € .... [1]

(b) Change €90 into pounds.

Answer (b) £.. [1]

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3   The top speed of a car is 54 metres per second.
Change this speed into kilometres per hour.

Answer ....km/h [2]

5 The ratios of teachers : male students : female students in a school are 2 : 17 : 18.
The total number of **students** is 665.
Find the number of **teachers**.

Answer .... [2]

6 A rectangular field is 18 metres long and 12 metres wide.
Both measurements are correct to the nearest metre.
Work out exactly the smallest possible area of the field.

Answer ....m^2 [2]

8 Complete this table of squares and cubes.
The numbers are not in sequence.

Number	Square	Cube
3	9	27
....	121	....
....	....	2744
....	....	−343

[3]

15 In 1950, the population of Switzerland was 4 714 900.
In 2000, the population was 7 087 000.

(a) Work out the percentage increase in the population from 1950 to 2000.

Answer (a)... % [2]

(b) (i) Write the 1950 population correct to 3 significant figures.

Answer (b)(i) .... [1]

(ii) Write the 2000 population in standard form.

Answer (b)(ii) .... [1]

1 Tickets for the theatre cost either $10 or $16.

    (a) Calculate the total cost of 197 tickets at $10 each and 95 tickets at $16 each.   [1]

    (b) On Monday, 157 tickets at $10 and n tickets at $16 were sold. The total cost was $4018. Calculate the value of n.   [2]

    (c) On Tuesday, 319 tickets were sold altogether. The total cost was $3784.
        Using x for the number of $10 tickets sold and y for the number of $16 tickets sold, write down two equations in x and y.

        Solve your equations to find the number of $10 tickets and the number of $16 tickets sold.   [5]

    (d) On Wednesday, the cost of a $16 ticket was reduced by 15%. Calculate this new reduced cost.   [2]

    (e) The $10 ticket costs 25% more than it did last year. Calculate the cost last year.   [2]

1 A train left Sydney at 23 20 on December 18th and arrived in Brisbane at 02 40 on December 19th. How long, in hours and minutes, was the journey?

Answer .... h .... min [1]

2 Use your calculator to find the value of

$$\frac{6\sin 50°}{\sin 25°}.$$

Answer .... [1]

3 Write the numbers 0.5^2, $\sqrt{0.5}$, 0.5^3 in order with the **smallest** first.

Answer .... < .... < .... [2]

4 Simplify

$$\frac{2}{3}p^{12} \times \frac{3}{4}p^8.$$

Answer .... [2]

6 The population, P, of a small island was 6380, correct to the nearest 10. Complete the statement about the limits of P.

Answer .... $\leqslant P <$ .... [2]

7   Work out the value of

$$\frac{-\frac{1}{2} - \frac{3}{8}}{-\frac{1}{2} + \frac{3}{8}}.$$

Answer .... [2]

9   Sara has $3000 to invest for 2 years.
     She invests the money in a bank which pays simple interest at the rate of 7.5% per year.
     Calculate how much interest she will have at the end of the 2 years.

Answer $ .... [2]

10   The area of a small country is 78 133 square kilometres.

     (a) Write this area correct to 1 significant figure.

Answer(a) .... km^2 [1]

     (b) Write your answer to **part (a)** in standard form.

Answer(b) .... km^2 [1]

1 Fatima and Mohammed each buys a bike.

 (a) Fatima buys a city-bike which has a price of $120.
  She pays 60 % of this price and then pays $10 per month for 6 months.

  (i) How much does Fatima pay altogether? [2]

  (ii) Work out your answer to **part (a)(i)** as a percentage of the original price of $120. [2]

 (b) Mohammed pays $159.10 for a mountain-bike in a sale.
  The original price had been reduced by 14 %.
  Calculate the original price of the mountain-bike. [2]

 (c) Mohammed's height is 169 cm and Fatima's height is 156 cm.
  The frame sizes of their bikes are in the same ratio as their heights.
  The frame size of Mohammed's bike is 52 cm.
  Calculate the frame size of Fatima's bike. [2]

 (d) Fatima and Mohammed are members of a school team which takes part in a bike ride for charity.

  (i) Fatima and Mohammed ride a total distance of 36 km.
   The ratio distance Fatima rides : distance Mohammed rides is 11 : 9.
   Work out the distance Fatima rides. [2]

  (ii) The distance of 36 km is only $\frac{2}{23}$ of the total distance the team rides.

   Calculate this total distance. [2]
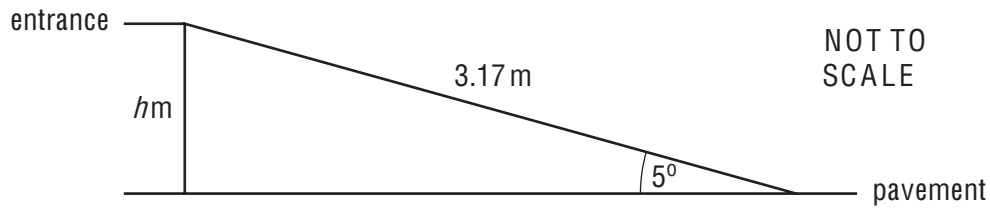
1 Calculate

$$\frac{5^2}{2^5}$$

(a) giving your answer as a fraction,

Answer (a) .... [1]

(b) giving your answer as a decimal.

Answer (b) .... [1]

2

A shop has a wheelchair ramp to its entrance from the pavement.
The ramp is 3.17 metres long and is inclined at 5° to the horizontal.
Calculate the height, *h* metres, of the entrance above the pavement.
Show all your working.

Answer .... m [2]

3 A block of cheese, of mass 8 kilograms, is cut by a machine into 500 equal slices.

(a) Calculate the mass of one slice of cheese in kilograms.

Answer (a) .... kg [1]

(b) Write your answer to **part (a)** in standard form.

Answer (b) .... kg [1]

4

7 To raise money for charity, Jalaj walks 22 km, correct to the nearest kilometre, every day for 5 days.

(a) Complete the statement in the answer space for the distance, d km, he walks in one day.

Answer (a) .... $\leqslant d <$ .... [2]

(b) He raises $1.60 for every kilometre that he walks.
Calculate the least amount of money that he raises at the end of the 5 days.

Answer (b) $ .... [1]

8 Solve the simultaneous equations

$$\tfrac{1}{2}x + 2y = 16,$$

$$2x + \tfrac{1}{2}y = 19.$$

Answer x = ...

y = ... [3]

9 The wavelength, w, of a radio signal is inversely proportional to its frequency, f.
When $f = 200$, $w = 1500$.

(a) Find an equation connecting f and w.

Answer (a) .... [2]

(b) Find the value of f when $w = 600$.

Answer (b) f = ... [1]

1   Hassan sells fruit and vegetables at the market.

(a) The mass of fruit and vegetables he sells is in the ratio
                                    fruit : vegetables = 5 : 7.
   Hassan sells 1.33 **tonnes** of vegetables.
   How many **kilograms** of fruit does he sell?   [3]

(b) The amount of money Hassan receives from selling fruit and vegetables is in the ratio
                                    fruit : vegetables = 9 : 8.
   Hassan receives a **total** of $765 from selling fruit and vegetables.
   Calculate how much Hassan receives from selling fruit.   [2]

(c) Calculate the average price of Hassan's fruit, in dollars per kilogram.   [2]

(d) (i) Hassan sells oranges for $0.35 per kilogram.
        He reduces this price by 40%.
        Calculate the new price per kilogram.   [2]

   (ii) The price of $0.35 per kilogram of oranges is an increase of 25% on the previous day's price.
        Calculate the previous day's price.   [2]

1 The planet Neptune is 4 496 000 000 kilometres from the Sun.
Write this distance in standard form.

Answer .... km [1]

2 Write down the next prime number after 89.

Answer .... [1]

3 The table gives the average surface temperature (°C) on the following planets.

Planet	Earth	Mercury	Neptune	Pluto	Saturn	Uranus
Average temperature	15	350	−220	−240	−180	−200

(a) Calculate the range of these temperatures.

Answer(a) .... °C [1]

(b) Which planet has a temperature 20 °C lower than that of Uranus?

Answer(b) .... [1]

4 Work out

$$\frac{2\tan 30°}{1-\left(\tan 30°\right)^2}.$$

Answer .... [2]

5 In triangle *ABC*, *AB* = 6 cm, *AC* = 8 cm and *BC* = 12 cm. Angle *ACB* = 26.4°.
Calculate the area of the triangle *ABC*.
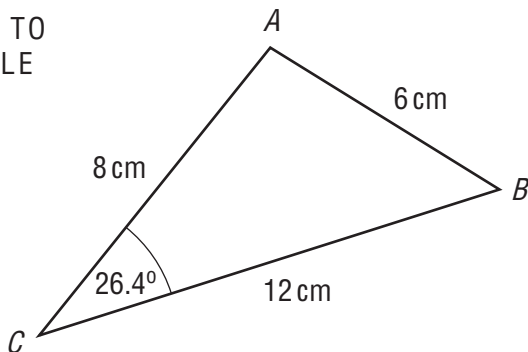
Answer .... cm^2 [2]

10 For the sequence $\quad 5\frac{1}{2}, \qquad 7, \qquad 8\frac{1}{2}, \qquad 10, \qquad 11\frac{1}{2}, \qquad \ldots$

(a) find an expression for the *n*th term,

Answer(a) .... [2]

(b) work out the 100th term.

Answer(b) .... [1]

11 $\qquad\qquad\qquad f(x) = \dfrac{x+3}{x}, \quad x \neq 0.$

(a) Calculate $f\left(\frac{1}{4}\right)$.

Answer(a) .... [1]

(b) Solve $f(x) = \frac{1}{4}$.

Answer(b) x = ... [2]

12 Solve the simultaneous equations

$$0.4x + 2y = 10,$$
$$0.3x + 5y = 18.$$

Answer x = ...

y = ... [3]

13 Solve the equation

$$\frac{x-2}{4} = \frac{2x+5}{3}.$$

Answer x = ... [3]

14 A company makes two models of television.
Model *A* has a rectangular screen that measures 44 cm by 32 cm.
Model *B* has a larger screen with these measurements increased in the ratio 5:4.

(a) Work out the measurements of the larger screen.

Answer(a) .... cm by .... cm [2]

(b) Find the **fraction** $\dfrac{\text{model } A \text{ screen area}}{\text{model } B \text{ screen area}}$ in its simplest form.

Answer(b) .... [1]

15 Angharad had an operation costing $500.
She was in hospital for *x* days.
The cost of nursing care was $170 for each day she was in hospital.

(a) Write down, in terms of *x*, an expression for the total cost of her operation and nursing care.

Answer(a)$ .... [1]

(b) The total cost of her operation and nursing care was $2370.
Work out how many days Angharad was in hospital.

Answer(b) .... [2]

16 In 2004 Colin had a salary of $7200.

(a) This was an increase of 20% on his salary in 2002.
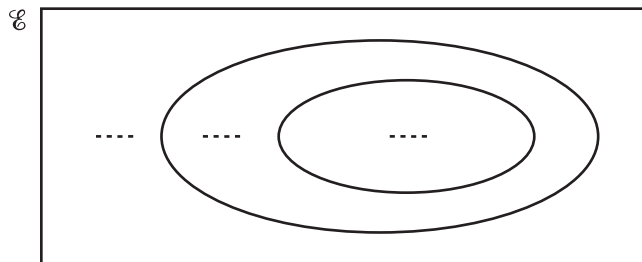Calculate his salary in 2002.

Answer(a)$ .... [2]

(b) In 2006 his salary increased to $8100.
Calculate the percentage increase from 2004 to 2006.

Answer(b) .... % [2]

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17 n(A) = 18, n(B) = 11 and n($A \cup B$)′ = 0.

(a) Label the Venn diagram to show the sets A and B where n($A \cup B$) = 18.
Write down the number of elements in each region.

[2]

(b) Draw another Venn diagram to show the sets A and B where n($A \cup B$) = 29.
Write down the number of elements in each region.

[2]

22

NORTH EASTERN BANK SAVINGS ACCOUNT **5%** Per Year Simple Interest	SOUTH WESTERN BANK SAVINGS ACCOUNT **4.9%** Per Year Compound Interest

Kalid and his brother have $2000 each to invest for 3 years.

(a) North Eastern Bank advertises savings with **simple** interest at 5% per year.
Kalid invests his money in this bank.
How much money will he have at the end of 3 years?

Answer(a)$ .... [2]
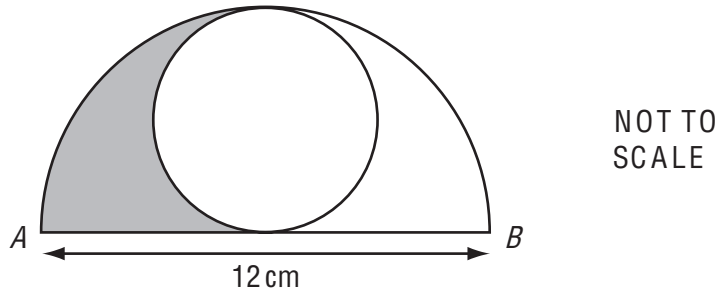
(b) South Western Bank advertises savings with **compound** interest at 4.9% per year.
Kalid's brother invests his money in this bank.
At the end of 3 years, how much **more** money will he have than Kalid?

Answer(b)$ .... [3]

23

A ← 12 cm → B

NOT TO SCALE

The largest possible circle is drawn inside a semicircle, as shown in the diagram.
The distance *AB* is 12 centimetres.

(a) Find the shaded area.

Answer(a) .... cm² [4]

(b) Find the perimeter of the shaded area.

Answer(b) .... cm [2]

1 (a) The scale of a map is 1:20 000 000.

On the map, the distance between Cairo and Addis Ababa is 12 cm.

(i) Calculate the distance, in kilometres, between Cairo and Addis Ababa. [2]

(ii) On the map the area of a desert region is 13 square centimetres.

Calculate the actual area of this desert region, in square kilometres. [2]

(b) (i) The actual distance between Cairo and Khartoum is 1580 km.

On a different map this distance is represented by 31.6 cm.

Calculate, in the form $1:n$, the scale of this map. [2]

(ii) A plane flies the 1580 km from Cairo to Khartoum.

It departs from Cairo at 11 55 and arrives in Khartoum at 14 03.

Calculate the average speed of the plane, in kilometres per hour. [4]

2

1 Vreni took part in a charity walk.
She walked a distance of 20 kilometres.

(a) She raised money at a rate of $12.50 for each kilometre.

    (i) How much money did she raise by walking the 20 kilometres? [1]

    (ii) The money she raised in **part (a)(i)** was $\frac{5}{52}$ of the total money raised.

      Work out the total money raised. [2]

    (iii) In the previous year the total money raised was $2450.
      Calculate the percentage increase on the previous year's total. [2]

(b) Part of the 20 kilometres was on a road and the rest was on a footpath.
The ratio road distance : footpath distance was 3:2.

    (i) Work out the road distance. [2]

    (ii) Vreni walked along the road at 3 km/h and along the footpath at 2.5 km/h.
      How long, in hours and minutes, did Vreni take to walk the 20 kilometres? [2]

    (iii) Work out Vreni's average speed. [1]

    (iv) Vreni started at 08 55. At what time did she finish? [1]

(c) On a map, the distance of 20 kilometres was represented by a length of 80 centimetres.
The scale of the map was 1 : n.
Calculate the value of n. [2]

8   **Answer the whole of this question on a sheet of graph paper.**
    Use one side for your working and one side for your graphs.

Alaric invests $100 at 4% per year **compound interest.**

(a) How many dollars will Alaric have after 2 years?   [2]

(b) After x years, Alaric will have y dollars.
    He knows a formula to calculate y.
    The formula is $y = 100 \times 1.04^x$

x (Years)	0	10	20	30	40
y (Dollars)	100	p	219	q	480

Use this formula to calculate the values of p and q in the table.   [2]

(c) Using a scale of 2 cm to represent 5 years on the x-axis and 2 cm to represent $50 on the y-axis, draw an x-axis for $0 \leqslant x \leqslant 40$ and a y-axis for $0 \leqslant y \leqslant 500$.

Plot the five points in the table and draw a smooth curve through them.   [5]

(d) Use your graph to estimate

   (i) how many dollars Alaric will have after 25 years,   [1]

   (ii) how many years, to the nearest year, it takes for Alaric to have $200.   [1]

(e) Beatrice invests $100 at 7% per year **simple interest**.

   (i) Show that after 20 years Beatrice has $240.   [2]

   (ii) How many dollars will Beatrice have after 40 years?   [1]

   (iii) On the **same grid**, draw a graph to show how the $100 which Beatrice invests will increase during the 40 years.   [2]

(f) Alaric first has more than Beatrice after n years.
    Use your graphs to find the value of n.   [1]

2

1 Marcus receives $800 from his grandmother.

(a) He decides to spend $150 and to divide the remaining $650 in the ratio

$$\text{savings} : \text{holiday} = 9 : 4.$$

Calculate the amount of his savings.

Answer(a) $ .... [2]

(b) (i) He uses 80% of the $150 to buy some clothes.

Calculate the cost of the clothes.

Answer(b)(i) $ .... [2]

(ii) The money remaining from the $150 is $37\frac{1}{2}$ % of the cost of a day trip to Cairo.

Calculate the cost of the trip.

Answer(b)(ii) $ .... [2]

(c) (i) Marcus invests $400 of his savings for 2 years at 5 % per year **compound** interest.

Calculate the amount he has at the end of the 2 years.

Answer(c)(i) $ .... [2]

(ii) Marcus's sister also invests $400, at r % per year **simple** interest.
At the end of 2 years she has exactly the same amount as Marcus.

Calculate the value of r.

Answer(c)(ii) $r =$ .... [3]

2

1 Write the numbers in order of size with the **smallest** first.

$$\sqrt{10} \qquad 3.14 \qquad \frac{22}{7} \qquad \pi$$

Answer .... < .... < .... < .... [2]

2 Michel changed \$600 into pounds (£) when the exchange rate was £1 = \$2.40.
He later changed all the pounds back into dollars when the exchange rate was £1 = \$2.60.

How many dollars did he receive?

Answer \$ .... [2]

3 *p* is the largest prime number between 50 and 100.
q is the smallest prime number between 50 and 100.

Calculate the value of *p* – *q*.

Answer .... [2]

4 A person in a car, travelling at 108 kilometres per hour, takes 1 second to go past a building on the side of the road.

Calculate the length of the building in metres.

Answer .... m [2]

3

5 Calculate the value of $5(6 \times 10^3 + 400)$, giving your answer in standard form.

Answer .... [2]

6 Calculate the value of $\dfrac{1}{2}\sqrt{\dfrac{1}{2}} + \dfrac{1}{2}\sqrt{\dfrac{1}{2}}$

(a) writing down all the figures in your calculator answer,

Answer(a) .... [1]

(b) writing your answer correct to 4 significant figures.

Answer(b) .... [1]

7
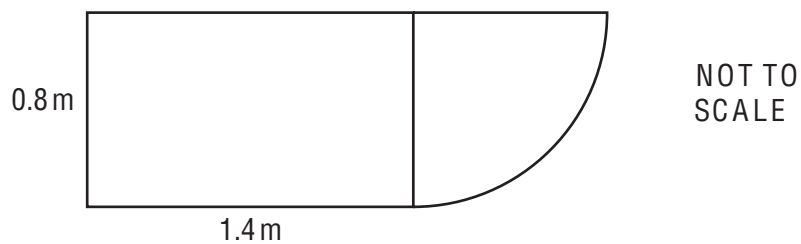
The top of a desk is made from a rectangle and a quarter circle.
The rectangle measures 0.8m by 1.4m.

Calculate the surface area of the top of the desk.

Answer .... m^2 [3]

9 A cyclist left Melbourne on Wednesday 21 May at 09 45 to travel to Sydney.
The journey took 97 hours.

Write down the day, date and time that the cyclist arrived in Sydney.

Answer   Day .... Date .... Time .... [3]

10
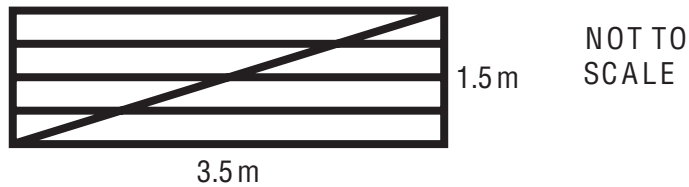
The diagram represents a rectangular gate measuring 1.5m by 3.5m.
It is made from eight lengths of wood.

Calculate the total length of wood needed to make the gate.

Answer .... m [3]

1 During one week in April, in Quebec, the daily minimum temperatures were

    –5°C,   –1°C,   3°C,   2°C,   –2°C,   0°C,   6°C.

Write down

(a) the lowest of these temperatures,

Answer(a) .... °C   [1]

(b) the range of these temperatures.

Answer(b) .... °C   [1]

2 $\sqrt{23}$ 48%   4.80 $\dfrac{53}{11}$

Write the numbers in order of size with the **largest** first.

Answer .... > .... > .... > ....   [2]

3 Ricardo changed $600 into pounds (£) when the exchange rate was $1 = £0.60.
He later changed all the pounds back into dollars when the exchange rate was $1 = £0.72.

How many dollars did he receive?

Answer $ ....   [2]

4 The maximum speed of a car is 252 km/h.

Change this speed into metres per second.

Answer .... m/s   [2]

3

5 Amalie makes a profit of 20% when she sells a shirt for $21.60.

Calculate how much Amalie paid for the shirt.

Answer $ .... [2]

6 $3^x \times 9^4 = 3^n$.

Find n in terms of x.

Answer n = ... [2]

8 Write as a single fraction in its simplest form

$$\frac{x}{3} + \frac{x-1}{2}.$$

Answer .... [2]

9 1 second $= 10^6$ microseconds.

Change 3×10^{13} microseconds into minutes. Give your answer in standard form.

Answer .... min   [2]

10 The length of each side of an equilateral triangle is 74 mm, correct to the nearest millimetre.

Calculate the smallest possible perimeter of the triangle.

Answer .... mm   [2]

Answer PF = ... m   [3]

1 A school has 220 boys and 280 girls.

(a) Find the ratio of boys to girls, in its simplest form.

Answer(a) .... : .... [1]

(b) The ratio of students to teachers is 10 : 1.
Find the number of teachers.

Answer(b) .... [2]

(c) There are 21 students on the school's committee.
The ratio of boys to girls is 3 : 4.
Find the number of girls on the committee.

Answer(c) .... [2]

(d) The committee organises a disco and sells tickets.
35% of the school's students each buy a ticket. Each ticket costs $1.60.
Calculate the total amount received from selling the tickets.

Answer(d) $ .... [3]

(e) The cost of running the disco is $264.
This is an increase of 10% on the cost of running last year's disco.
Calculate the cost of running last year's disco.

Answer(e) $ .... [2]

1   Alberto and Maria share $240 in the ratio 3 : 5.

   (a) Show that Alberto receives $90 and Maria receives $150.

   Answer(a)

                                                                                                   [1]

   (b) (i) Alberto invests his $90 for 2 years at r % per year **simple** interest.
             At the end of 2 years the amount of money he has is $99.
             Calculate the value of r.

                                                   Answer(b)(i) $r =$ .... [2]

   (ii) The $99 is 60% of the cost of a holiday.
           Calculate the cost of the holiday.

                                                   Answer(b)(ii) $ .... [2]

   (c) Maria invests her $150 for 2 years at 4% per year **compound** interest.
          Calculate the exact amount Maria has at the end of 2 years.

                                                   Answer(c) $ .... [2]

   (d) Maria continues to invest her money at 4% per year **compound** interest.
          After 20 years she has $328.67.

   (i) Calculate exactly how much more this is than $150 invested for 20 years at 4% per year
           simple interest.

                                                   Answer(d)(i) $ .... [3]

   (ii) Calculate $328.67 as a percentage of $150.

                                                   Answer(d)(ii) .... %   [2]

1 Daniella is 8 years old and Edward is 12 years old.

(a) Their parents give them some money in the ratio of their ages.

(i) Write the ratio   Daniella's age : Edward's age   in its simplest form.

Answer(a)(i) .... : .... [1]

(ii) Daniella receives $30.
Show that Edward receives $45.

Answer(a)(ii)

[1]

(iii) What percentage of the total amount of money given by their parents does Edward receive?

Answer(a)(iii) .... % [2]

(b) Daniella invests her $30 at 3% per year, **compound** interest.
Calculate the amount Daniella has after 2 years.
Give your answer correct to 2 decimal places.

Answer(b) $ .... [3]

(c) Edward also invests $30.
He invests this money at a rate of r% per year, **simple** interest.
After 5 years he has a total amount of $32.25.
Calculate the value of r.

Answer(c) r = ... [2]

1   A concert hall has 1540 seats.

    Calculate the number of people in the hall when 55% of the seats are occupied.

                                                    Answer .... [1]

_____

2   **(a)** Write down in figures the number twenty thousand three hundred and seventy six.

                                                    Answer(a) .... [1]

    (b) Write your answer to **part (a)** correct to the nearest hundred.

                                                    Answer(b) .... [1]

_____

3   For an equilateral triangle, write down

    (a) the number of lines of symmetry,

                                                    Answer(a) .... [1]

    (b) the order of rotational symmetry.

                                                    Answer(b) .... [1]

_____

3

5 Mark and Naomi share $600 in the ratio   Mark : Naomi = 5 : 1.

Calculate how much money Naomi receives.

Answer $ .... [2]

6 Calculate the area of a circle with radius 6.28 centimetres.

Answer .... cm^2 [2]

7 The scale on a map is 1 : 20 000.

Calculate the actual distance between two points which are 2.7 cm apart on the map.
Give your answer in kilometres.

Answer .... km [2]

8 **(a)** Find *m* when $4^m \times 4^2 = 4^{12}$.

Answer(a) m = ... [1]

(b) Find *p* when $6^p \div 6^7 = 6^2$.

Answer(b) p = ... [1]

12 (a) Write 1738.279 correct to 1 decimal place.

Answer(a) .... [1]

(b) Write 28 700 in standard form.

Answer(b) .... [1]

(c) The mass of a ten-pin bowling ball is 7 kg to the nearest kilogram.

Write down the lower bound of the mass of the ball.

Answer(c) .... kg [1]

---

13 Paulo invests $3000 at a rate of 4% per year **compound** interest.

Calculate the **total** amount Paulo has after 2 years.
Give your answer correct to the nearest dollar.

Answer $ .... [3]

---

14 A train leaves Barcelona at 21 28 and takes 10 hours and 33 minutes to reach Paris.

(a) Calculate the time the next day when the train arrives in Paris.

Answer(a) .... [1]

(b) The distance from Barcelona to Paris is 827 km.

Calculate the average speed of the train in kilometres per hour.

Answer(b) .... km/h [3]

---

15 (a) The table shows part of a railway timetable.

Peartree Station	arrival time	12 58	13 56	14 54	15 52
	departure time	13 07	14 05	15 03	16 01

(i) Each train waits the same number of minutes at Peartree Station.

Write down how many minutes each train waits.

Answer(a)(i) .... min [1]

(ii) Janine is at Peartree Station at 3 pm.

At what time does the next train depart?

Answer(a)(ii) .... [1]

(b) The average temperature each month in Moscow and Helsinki is recorded.
The table shows this information from January to June.

	January	February	March	April	May	June
Temperature in Moscow (°C)	−16	−14	−8	1	8	11
Temperature in Helsinki (°C)	−9	−10	−7	−1	4	10

(i) Find the difference in temperature between Moscow and Helsinki in **January**.

Answer(b)(i) .... °C [1]

(ii) Find the increase in temperature in Helsinki from March to June.

Answer(b)(ii) .... °C [1]

5 Show that $1\dfrac{5}{9} \div 1\dfrac{7}{9} = \dfrac{7}{8}$.

Write down all the steps in your working.

Answer

[2]

---

6 $\dfrac{3}{5} < p < \dfrac{2}{3}$

Which of the following could be a value of *p*?

$$\dfrac{16}{27} \qquad 0.67 \qquad 60\% \qquad (0.8)^2 \qquad \sqrt{\dfrac{4}{9}}$$

Answer .... [2]

---

7 Calculate 324×17.

Give your answer in standard form, correct to 3 significant figures.

Answer .... [2]

---

13 (a) Rewrite this calculation with all the numbers rounded to 1 significant figure.

$$\frac{77.8}{21.9 - 3.8 \times 4.3}$$

Answer(a) [1]

(b) Use your answer to **part (a)** to work out an estimate for the calculation.

Answer(b) .... [1]

(c) Use your calculator to find the **actual** answer to the calculation in **part (a)**.
Give your answer correct to 1 decimal place.

Answer(c) .... [2]

14 (a) Complete the list to show all the factors of 18.

   1,   2, ... , ... , ... ,   18   [2]
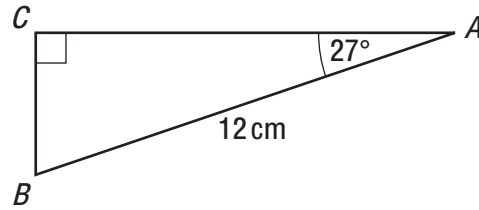
(b) Write down the prime factors of 18.

Answer(b) .... [1]

(c) Write down all the multiples of 18 between 50 and 100.

Answer(c) .... [1]

10

In triangle *ABC*, *AB* = 12 cm, angle *C* = 90° and angle *A* = 27°.
Calculate the length of *AC*.

Answer AC = ... cm [2]

11
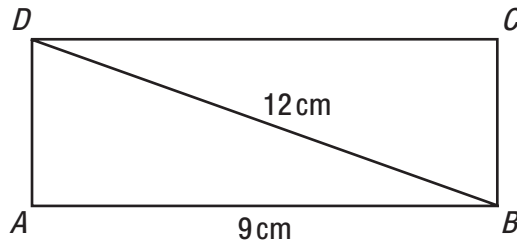
In the rectangle *ABCD*, *AB* = 9 cm and *BD* = 12 cm.
Calculate the length of the side *BC*.

Answer BC = ... cm [3]

12 (a) Write 16 460 000 in standard form.

Answer(a) .... [1]

(b) Calculate $7.85 \div (2.366 \times 10^2)$, giving your answer in standard form.

Answer(b) .... [2]

13 (a) Find the value of x when $\dfrac{18}{24} = \dfrac{27}{x}$.

Answer(a) x = ... [1]

(b) Show that $\dfrac{2}{3} \div 1\dfrac{1}{6} = \dfrac{4}{7}$.

Write down all the steps in your working.

Answer(b)

[2]

14 (a) A drinking glass contains 55 cl of water.
Write 55 cl in litres.

Answer(a) .... litres [1]

(b) The mass of grain in a sack is 35 kg.
The grain is divided equally into 140 bags.

Calculate the mass of grain in each bag.
Give your answer in grams.

Answer(b) .... g [2]

15 (a) Write 67.499 correct to the nearest integer.

Answer(a) .... [1]

(b) Write 0.003040506 correct to 3 significant figures.

Answer(b) .... [1]

(c) $d = 56.4$, correct to 1 decimal place.

Write down the lower bound of d.

Answer(c) .... [1]

18 Eva invests $120 at a rate of 3% per year **compound interest**.

Calculate the total amount Eva has after 2 years.
Give your answer correct to 2 decimal places.

Answer $ .... [3]

19 At a ski resort the temperature, in °C, was measured every 4 hours during one day.

The results were   −12°,   −13°,   −10°,   4°,   4°,   −6°.

(a) Find the difference between the highest and the lowest of these temperatures.

Answer(a) .... °C [1]

(b) Find

   (i) the mean,

Answer(b)(i) .... °C [2]

   (ii) the median,

Answer(b)(ii) .... °C [2]

   (iii) the mode.

Answer(b)(iii) .... °C [1]

1   A concert hall has 1540 seats.

Calculate the number of people in the hall when 55% of the seats are occupied.

Answer ....   [1]

3   Calculate $81^{0.25} \div 4^{-2}$.

Answer ....   [2]

4   **(a)** Find m when $4^m \times 4^2 = 4^{12}$.

Answer(a) m = ...   [1]

(b) Find p when $6^p \div 6^5 = \sqrt{6}$.

Answer(b) p = ...   [1]

5 A hummingbird beats its wings 24 times per second.

(a) Calculate the number of times the hummingbird beats its wings in one hour.

Answer(a) .... [1]

(b) Write your answer to **part (a)** in standard form.

Answer(b) .... [1]

6

NOT TO SCALE

6 cm

2 cm
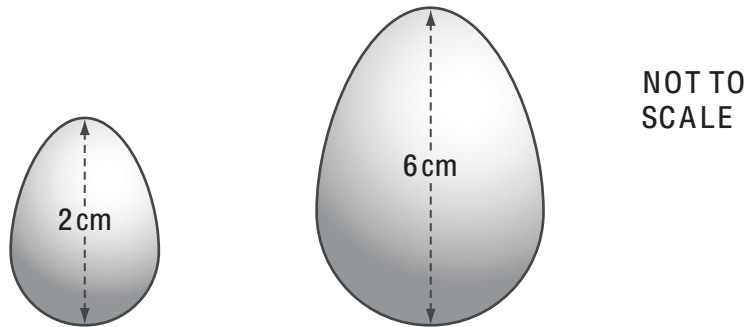
A company makes solid chocolate eggs and their shapes are mathematically similar.
The diagram shows eggs of height 2 cm and 6 cm.
The mass of the small egg is 4 g.

Calculate the mass of the large egg.

Answer .... g [2]

5

11 A rectangular photograph measures 23.3 cm by 19.7 cm, each correct to 1 decimal place.
Calculate the lower bound for

(a) the perimeter,

Answer(a) .... cm [2]

(b) the area.

Answer(b) .... cm^2 [1]

12 A train leaves Barcelona at 21 28 and takes 10 hours and 33 minutes to reach Paris.

(a) Calculate the time the next day when the train arrives in Paris.

Answer(a) .... [1]

(b) The distance from Barcelona to Paris is 827 km.

Calculate the average speed of the train in kilometres per hour.

Answer(b) .... km/h [3]

13 The scale on a map is 1: 20 000.

   (a) Calculate the actual distance between two points which are 2.7 cm apart on the map.
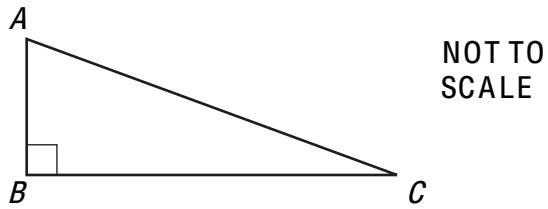   Give your answer in kilometres.

Answer(a) .... km [2]

   (b) A field has an area of 64 400 m^2.
        Calculate the area of the field on the map in cm^2.

Answer(b) .... cm^2 [2]

1 In the right-angled triangle ABC, $\cos C = \dfrac{4}{5}$. Find angle A.

NOT TO SCALE

Answer Angle A = ... [2]

---

2 Which of the following numbers are irrational?

$$\dfrac{2}{3} \qquad \sqrt{36} \qquad \sqrt{3} + \sqrt{6} \qquad \pi \qquad 0.75 \qquad 48\% \qquad 8^{\frac{1}{3}}$$

Answer .... [2]

---

3 Show that $1\dfrac{5}{9} \div 1\dfrac{7}{9} = \dfrac{7}{8}$.

Write down all the steps in your working.

Answer

[2]

4
$$\frac{3}{5} < p < \frac{2}{3}$$

Which of the following could be a value of p?

$$\frac{16}{27} \qquad 0.67 \qquad 60\% \qquad (0.8)^2 \qquad \sqrt{\frac{4}{9}}$$

Answer .... [2]

---

5 A meal on a boat costs 6 euros (€) or 11.5 Brunei dollars ($).

In which currency does the meal cost less, on a day when the exchange rate is €1 = $1.9037?
Write down all the steps in your working.

Answer .... [2]

---

6 Use your calculator to find the value of $2^{\sqrt{3}}$.

Give your answer correct to 4 significant figures.

Answer .... [2]

4

7 Solve the equation $4x + 6 \times 10^3 = 8 \times 10^4$.

Give your answer in standard form.

Answer x = ... [3]

8 p varies directly as the square root of q.
$p = 8$ when $q = 25$.

Find p when $q = 100$.

Answer p = ... [3]

9 Ashraf takes 1500 steps to walk d **metres** from his home to the station.
Each step is 90 centimetres correct to the nearest 10 cm.

Find the lower bound and the upper bound for d.

Answer .... $\leqslant d <$ .... [3]

10 The table shows the opening and closing times of a café.

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Opening time	0600	0600	0600	0600	0600	(*a*)	0800
Closing time	2200	2200	2200	2200	2200	2200	1300

(a) The café is open for a total of 100 hours each week.
Work out the opening time on Saturday.

Answer(a) .... [2]

(b) The owner decides to close the café at a later time on Sunday. This increases the **total** number of hours the café is open by 4%.
Work out the new closing time on Sunday.

Answer(b) .... [1]

---

11 Rearrange the formula $c = \dfrac{4}{a - b}$ to make *a* the subject.
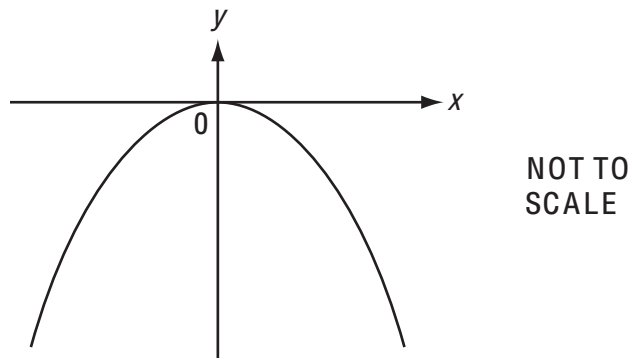
Answer a = ... [3]

---

4 Helen measures a rectangular sheet of paper as 197 mm by 210 mm, each correct to the nearest millimetre.
Calculate the upper bound for the perimeter of the sheet of paper.

Answer .... mm [2]

5

The sketch shows the graph of $y = ax^n$ where a and n are integers.

Write down a possible value for a and a possible value for n.

Answer a = ...

n = ... [2]

6 (a) Write 16 460 000 in standard form.

Answer(a) .... [1]

(b) Calculate $7.85 \div (2.366 \times 10^2)$, giving your answer in standard form.

Answer(b) .... [2]

7 **(a)** Find the value of x when $\dfrac{18}{24} = \dfrac{27}{x}$.

Answer(a) $x =$ .... [1]

(b) Show that $\dfrac{2}{3} \div 1\dfrac{1}{6} = \dfrac{4}{7}$.

Write down all the steps in your working.

Answer(b)

[2]

9 Eva invests $120 at a rate of 3% per year **compound interest**.

Calculate the total amount Eva has after 2 years.
Give your answer correct to 2 decimal places.

Answer $ .... [3]

6

12 Federico changed 400 euros (€) into New Zealand dollars (NZ$) at a rate of €1 = NZ$ 2.1 .
He spent *x* New Zealand dollars and changed the rest back into euros at a rate of €1 = NZ$ *d*.

Find an expression, in terms of *x* and *d*, for the number of euros Federico received.

Answer € .... [3]

9

18 Simplify the following.

(a) $(3x^3)^3$

Answer(a) .... [2]

(b) $(125x^6)^{\frac{2}{3}}$

Answer(b) .... [2]

---

19 The scale of a map is $1:250\,000$.

(a) The actual distance between two cities is $80\,$km.

Calculate this distance on the map. Give your answer in centimetres.

Answer(a) .... cm [2]

(b) On the map a large forest has an area of $6\,$cm^2.

Calculate the actual area of the forest. Give your answer in square kilometres.

Answer(b) .... km^2 [2]

1   Mr and Mrs Clark and their three children live in the USA and take a holiday in Europe.

(a) Mr Clark changes $500 into euros (€) when the exchange rate is €1 = $1.4593.

Calculate how much he receives.
Give your answer correct to 2 decimal places.

Answer(a) € .... [2]

(b) Tickets for an amusement park cost €62 for an adult and €52 for a child.

Work out the cost for Mr and Mrs Clark and their three children to visit the park.

Answer(b) € .... [3]

(c) Mr Clark sees a notice:

SPECIAL OFFER!

Family ticket €200

Work out €200 as a percentage of your answer to **part (b)**.

Answer(c) .... % [1]

3

(d) Mrs Clark buys 6 postcards at €0.98 each.
She pays with a €10 note.

Calculate how much change she will receive.

Answer(d) € .... [2]

(e) Children under a height of 130 cm are not allowed on one of the rides in the park.
Helen Clark is 50 inches tall.

Use 1 inch = 2.54 cm to show that she will not be allowed on this ride.

Answer(e)

[1]

6 **(a)** 103 112 125 132 144 159 161

From the list above, write down

(i) a square number,

Answer(a)(i) .... [1]

(ii) a cube number,

Answer(a)(ii) .... [1]

(iii) a prime number,

Answer(a)(iii) .... [1]

(iv) an odd number which is a multiple of 3.

Answer(a)(iv) .... [1]

(b) Write 88 as a product of prime numbers.

Answer(b) .... [2]

(c) Find the highest common factor of 72 and 96.

Answer(c) .... [2]

(d) Find the lowest common multiple of 15 and 20.

Answer(d) .... [2]

1   Falla buys 3000 square metres of land for a house and garden.
    The garden is divided into areas for flowers, vegetables and grass.

    He divides the land in the following ratio.

    $$\text{house : flowers : vegetables : grass} = 4 : 7 : 8 : 5$$

    (a) (i) Show that the area of land used for flowers is $875\,\text{m}^2$.

    Answer(a)(i)

    [2]

    (ii) Calculate the area of land used for the house.

    Answer(a)(ii) .... m^2 [2]

    (b) Write down the fraction of land used for vegetables.
    Give your answer in its simplest form.

    Answer(b) .... [2]

(c) During the first year Falla plants flowers in 64% of the 875 m^2.

Calculate the area he plants with flowers.

Answer(c) .... m^2 [2]

(d) Falla sells some of the vegetables he grows.
These vegetables cost $85 to grow.
He sells them for $105.

Calculate his percentage profit.

Answer(d) .... % [3]

(e) To buy the land Falla borrowed $5000 at a rate of 6.4% **compound** interest for 2 years.

Calculate the **total** amount he pays back at the end of the 2 years.
Give your answer correct to the nearest dollar.

Answer(e) $ .... [3]

1 At a theatre, adult tickets cost $5 each and child tickets cost $3 each.

(a) Find the total cost of 110 adult tickets and 85 child tickets.

Answer(a) $ .... [2]

(b) The total cost of some tickets is $750.
There are 120 adult tickets.

Work out the number of child tickets.

Answer(b) .... [2]

(c) The ratio of the **number** of adults to the **number** of children during one performance is

adults : children = 3 : 2.

(i) The total number of adults and children in the theatre is 150.

Find the number of adults in the theatre.

Answer(c)(i) .... [2]

(ii) For this performance, find the ratio **total cost** of adult tickets : **total cost** of child tickets.
Give your answer in its simplest form.

Answer(c)(ii) .... : .... [3]

(d) The $5 cost of an adult ticket is increased by 30%.

Calculate the new cost of an adult ticket.

Answer(d) $ .... [2]

(e) The cost of a child ticket is reduced from $3 to $2.70.

Calculate the percentage decrease in the cost of a child ticket.

Answer(e) .... % [3]

1 A school has a sponsored swim in summer and a sponsored walk in winter.
In 2010, the school raised a total of $1380.
The ratio of the money raised in   summer : winter = 62 : 53.

(a) **(i)** Show clearly that $744 was raised by the swim in **summer**.

Answer (a)(i)

[1]

(ii) Alesha's swim raised $54.10. Write this as a percentage of $744.

Answer(a)(ii) .... %[1]

(iii) Bryan's swim raised $31.50.
He received 75 cents for each length of the pool which he swam.

Calculate the number of lengths Bryan swam.

Answer(a)(iii) .... [2]

(b)

1 **(a)** Work out the following.

(i) $\dfrac{1}{0.2^2}$

Answer(a)(i) .... [1]

(ii) $\sqrt{5.1^2 + 4 \times 7.3^2}$

Answer(a)(ii) .... [1]

(iii) $25^{\frac{1}{2}} \times 1000^{-\frac{2}{3}}$

Answer(a)(iii) .... [2]

(b) Mia invests \$7500 at 3.5% per year **simple** interest.
Calculate the total amount she has after 5 years.

Answer(b) \$ .... [3]

(c) Written as the product of prime factors $48 = 2^4 \times 3$.

(i) Write 60 as the product of prime factors.

Answer(c)(i) .... [2]

(ii) Work out the highest common factor (HCF) of 48 and 60.

Answer(c)(ii) .... [2]

(iii) Work out the lowest common multiple (LCM) of 48 and 60.

Answer(c)(iii) .... [2]

1 Lucy works in a clothes shop.

(a) In one week she earned $277.20.

  (i) She spent $\frac{1}{8}$ of this on food.

  Calculate how much she spent on food.

  Answer(a)(i) $ .... [1]

  (ii) She paid 15% of the $277.20 in taxes.
  Calculate how much she paid in taxes.

  Answer(a)(ii) $ .... [2]

  (iii) The $277.20 was 5% more than Lucy earned in the previous week.
  Calculate how much Lucy earned in the previous week.

  Answer(a)(iii) $ .... [3]

(b) The shop sells clothes for men, women and children.

  (i) In one day Lucy sold clothes with a total value of $2200 in the ratio

  men : women : children = 2 : 5 : 4.

  Calculate the value of the women's clothes she sold.

  Answer(b)(i) $ .... [2]

  (ii) The $2200 was $\frac{44}{73}$ of the total value of the clothes sold in the shop on this day.

  Calculate the total value of the clothes sold in the shop on this day.

  Answer(b)(ii) $ .... [2]

1 The table shows the maximum daily temperatures during one week in Punta Arenas.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
2°C	3°C	1°C	2.5°C	−1.5°C	1°C	2°C

    (a) By how many degrees did the maximum temperature change between Thursday and Friday?

Answer (a) .... [1]

    (b) What is the difference between the greatest and the least of these temperatures?

Answer (b) .... [1]

---

2 Nyali paid $62 for a bicycle. She sold it later for $46.
What was her percentage loss?

Answer ....% [2]

---

3 Three sets *A*, *B* and *K* are such that $A \subset K$, $B \subset K$ and $A \cap B = \emptyset$.
Draw a Venn diagram to show this information.

[2]

---

4 Alejandro goes to Europe for a holiday.
He changes 500 pesos into euros at an exchange rate of 1 euro = 0.975 pesos.
How much does he receive in euros? Give your answer correct to 2 decimal places.

Answer ....euros [2]

---

5 Write the four values in order, smallest first.

$$\frac{1}{1000}, \quad \frac{11}{1000}, \quad 0.11\%, \quad 0.0108.$$

Answer .... < .... < .... < .... [2]

7 Find the **exact** value of

(a) 3^{-2},

Answer (a) .... [1]

(b) $\left(1\frac{7}{9}\right)^{\frac{1}{2}}$.

Answer (b) .... [2]

8 The length of a road is 380 m, correct to the nearest 10 m.
Maria runs along this road at an average speed of 3.9 m/s.
This speed is correct to 1 decimal place.
Calculate the greatest possible time taken by Maria.

Answer .... s   [3]

1 **(a)** At an athletics meeting, Ben's time for the 10 000 metres race was 33 minutes exactly and he finished at 15 17.

   (i) At what time did the race start? [1]

   (ii) What was Ben's average speed for the race? Give your answer in kilometres per hour. [2]

   (iii) The winner finished 51.2 seconds ahead of Ben.
   How long did the winner take to run the 10 000 metres? [1]

(b) The winning distance in the javelin competition was 80 metres.
Otto's throw was 95% of the winning distance.
Calculate the distance of Otto's throw. [2]

(c) Pamela won the long jump competition with a jump of 6.16 metres.
This was 10% further than Mona's jump.
How far did Mona jump? [2]

2

1 Work out $\dfrac{2+12}{4+3\times 8}$.

Answer .... [1]

---

2 The altitude of Death Valley is −86 metres.
The altitude of Mount Whitney is 4418 metres.
Calculate the difference between these two altitudes.

Answer .... m [1]

---

3 The first five terms of a sequence are   4, 9, 16, 25, 36, …
Find

(a) the 10th term,

Answer (a).. [1]

(b) the nth term.

Answer (b).. [1]

---

4 Rearrange the quantities in order with the smallest first.

$$\tfrac{1}{8}\%, \qquad \tfrac{3}{2500}, \qquad 0.00126$$

Answer..................................<...................................<............................. [2]

---

5 $\mathscr{E} = \{-2\tfrac{1}{2},\ -1,\ \sqrt{2},\ 3.5,\ \sqrt{30},\ \sqrt{36}\}$
$X = \{\text{integers}\}$
$Y = \{\text{irrational numbers}\}$
List the members of

(a) X,

Answer (a) $X = \{$ ....$\}$ [1]

(b) Y.

Answer (b) $Y = \{$ ....$\}$ [1]

---

6   Abdul invested $240 when the rate of simple interest was $r\%$ per year.
After m **months** the interest was $I.
Write down and simplify an expression for I, in terms of m and r.

Answer I = ... [2]

---

7   A baby was born with a mass of 3.6 kg.
After three months this mass had increased to 6 kg.
Calculate the percentage increase in the mass of the baby.

Answer ....% [2]

---

8   **(a)** $3^x = \frac{1}{3}$.
Write down the value of x.

Answer (a) x =................................. [1]

   (b) $5^y = k$.
Find 5^{y+1}, in terms of k.

Answer (b) 5^{y+1} = ...[1]

---

9   **(a)** 32 493 people were at a football match.
Write this number to the nearest thousand.

Answer (a)... [1]

   (b) At another match there were 25 500 people, to the nearest hundred.
Complete the inequality about n, the number of people at this match.

Answer (b)..................$\leqslant n <$ ....[2]

10 When cars go round a bend there is a force, F, between the tyres and the ground.
F varies directly as the square of the speed, v.
When $v = 40$, $F = 18$.
Find F when $v = 32$.

Answer F =... [3]

---

11 In April 2001, a bank gave the following exchange rates.
1 euro = 0.623 British pounds.
1 euro = 1936 Italian lire.

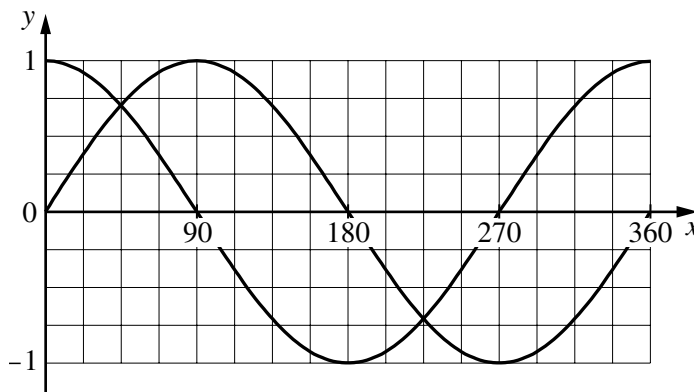**(a)** Calculate how much one pound was worth in lire.

Answer (a) ....lire [2]

(b) Calculate how much one million lire was worth in pounds.

Answer (b) ....pounds [1]

---

12 The diagram shows the graphs of $y = \sin x°$ and $y = \cos x°$.

Find the values of x between 0 and 360 for which

(a) $\sin x° = \cos x°$,

Answer (a) $x =$............ or $x =$ .... [2]

(b) $\sin x° = \sin 22.5°$ $(x \neq 22.5)$.

Answer (b) $x =$.................................. [1]

18 The population of Europe is 580 000 000 people.
The land area of Europe is 5 900 000 square kilometres.

(a) Write 580 000 000 in standard form.

Answer (a).. [1]

(b) Calculate the number of people per square kilometre, to the nearest whole number.

Answer (b) .... [2]

(c) Calculate the number of square **metres** per person.

Answer (c) .... m^2 [2]

1 A train starts its journey with 240 passengers.
144 of the passengers are adults and the rest are children.

(a) Write the ratio   Adults : Children   in its lowest terms. [2]

(b) At the first stop, $37\frac{1}{2}\%$ of the adults and $\frac{1}{3}$ of the children get off the train.
20 adults and x children get onto the train.
The total number of passengers on the train is now 200.

    (i) How many children got off the train? [1]

    (ii) How many adults got off the train? [1]

    (iii) How many **adult** passengers are **on** the train as it sets off again? [1]

    (iv) What is the value of x? [1]

(c) After a second stop, there are 300 passengers on the train and the ratio

    Men : Women : Children   is 6 : 5 : 4.

Calculate the number of children now on the train. [2]

(d) On Tuesday the train journey took 7 hours and 20 minutes and began at 13 53.

    (i) At what time did the train journey end? [1]

    (ii) Tuesday's time of 7 hours 20 minutes was 10% more than Monday's journey time.
How many minutes longer was Tuesday's journey? [2]

1 A pattern of numbers is shown below.

```
                        1
                    1       1
                1       2       1
            1       3       3       1
        1       4       6       4       1
    1       5       10      10      5       1
1       6       x       20      x       6       1
```

Write down the value of *x*.

Answer .... [1]

---

2 Calculate $\left(3 + 3\sqrt{3}\,\right)^3$ giving your answer correct to 1 decimal place.

Answer .... [2]

---

3 From the list of numbers $\dfrac{22}{7}$, π, $\sqrt{14}$, $\sqrt{16}$, 27.4, $\dfrac{65}{13}$ write down

(a) one integer,

Answer(a) .... [1]

(b) one irrational number.

Answer(b) .... [1]

7   The air resistance (R) to a car is proportional to the square of its speed (v).
When $R = 1800$, $v = 30$.
Calculate R when $v = 40$.

Answer R =... [3]

**8**   In 1997 the population of China was 1.24×10^9.
In 2002 the population of China was 1.28×10^9.
Calculate the percentage increase from 1997 to 2002.

Answer .... % [2]

1 The population of Newtown is 45 000.
The population of Villeneuve is 39 000.

   (a) Calculate the ratio of these populations in its simplest form. [1]

   (b) In Newtown, 28% of the population are below the age of twenty.
Calculate how many people in Newtown are below the age of twenty. [2]

   (c) In Villeneuve, 16 000 people are below the age of twenty.
Calculate the percentage of people in Villeneuve below the age of twenty. [2]

   (d) The population of Newtown is 125% **greater** than it was fifty years ago.
Calculate the population of Newtown fifty years ago. [2]

   (e) The two towns are combined and made into one city called Monocity.
In Monocity the ratio of
                men : women :children   is   12 : 13 : 5.
Calculate the number of children in Monocity. [2]

1
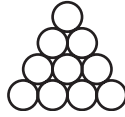
The number of tennis balls (*T*) in the diagram is given by the formula

$$T = \frac{1}{2}n(n+1),$$

where *n* is the number of rows.
The diagram above has 4 rows.
How many tennis balls will there be in a diagram with 20 rows?

Answer .... [1]

2   Calculate the value of   2(sin15°)(cos15°).

Answer .... [1]

4   Write down the next term in each of the following sequences.

(a) 8.2,   6.2,   4.2,   2.2,   0.2,   …

Answer(a) .... [1]

(b) 1,   3,   6,   10,   15,   …

Answer(b) .... [1]

5   Celine invests $ 800 for 5 **months** at 3 % simple interest per year.
Calculate the interest she receives.

Answer $ .... [2]

6 $(0.8)^{\frac{1}{2}}$, 0.8, $\sqrt{0.8}$, $(0.8)^{-1}$, $(0.8)^2$.

From the numbers above, write down

(a) the smallest,

Answer(a) .... [1]

(b) the largest.

Answer(b) .... [1]

7 $f(x) = 10^x$.

(a) Calculate f(0.5).

Answer(a) .... [1]

(b) Write down the value of $f^{-1}(1)$.

Answer(b) .... [1]

9 Write the number 2381.597 correct to

(a) 3 significant figures,

Answer(a) .... [1]

(b) 2 decimal places,

Answer(b) .... [1]

(c) the nearest hundred.

Answer(c) .... [1]

4

10 The mass of the Earth is $\frac{1}{95}$ of the mass of the planet Saturn.
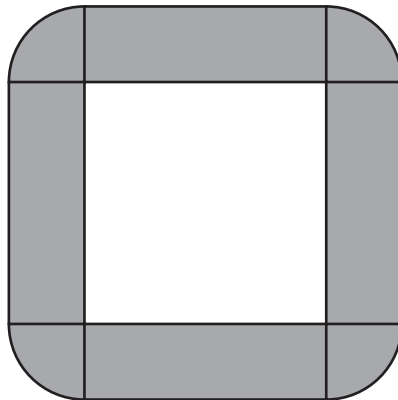
The mass of the Earth is 5.97×10^{24} kilograms.
Calculate the mass of the planet Saturn, giving your answer in standard form, correct to 2 significant figures.

Answer .... kg [3]

11 A large conference table is made from four rectangular sections and four corner sections.
Each rectangular section is 4 m long and 1.2 m wide.
Each corner section is a quarter circle, radius 1.2 m.

NOT TO
SCALE

Each person sitting at the conference table requires one metre of its outside perimeter.
Calculate the greatest number of people who can sit around the **outside** of the table.
Show all your working.

Answer .... [3]

1   A Spanish family went to Scotland for a holiday.

   (a) The family bought 800 pounds (£) at a rate of £1 = 1.52 euros (€).
   How much did this cost in euros?   [1]

   (b) The family returned home with £118 and changed this back into euros.
   They received €173.46.
   Calculate how many euros they received for each pound.   [1]

   (c) A toy which costs €11.50 in Spain costs only €9.75 in Scotland.
   Calculate, as a percentage of the cost in Spain, how much **less** it costs in Scotland.   [2]

   (d) The total cost of the holiday was €4347.00.
   In the family there were 2 adults and 3 children.
   The cost for one adult was double the cost for one child.
   Calculate the cost for one child.   [2]

   (e) The **original** cost of the holiday was **reduced** by 10% to €4347.00.
   Calculate the original cost.   [2]

   (f) The plane took 3 hours 15 minutes to return to Spain.
   The length of this journey was 2350 km.
   Calculate the average speed of the plane in

     (i) kilometres per hour,   [2]

     (ii) metres per second.   [1]

1 Two quantities c and d are connected by the formula $c = 2d + 30$.
Find c when $d = -100$.

Answer .... [1]

2 **(a)** $$\frac{2}{3} + \frac{5}{6} = \frac{x}{2}.$$

Find the value of x.

Answer(a) x= .... [1]

(b) $$\frac{5}{3} \div \frac{3}{y} = \frac{40}{9}.$$

Find the value of y.

Answer(b) y= .... [1]

3 Use your calculator to work out

(a) $\sqrt{(7 + 6 \times 243^{0.2})}$,

Answer(a) .... [1]

(b) $2 - \tan30° \times \tan60°$.

Answer(b) .... [1]

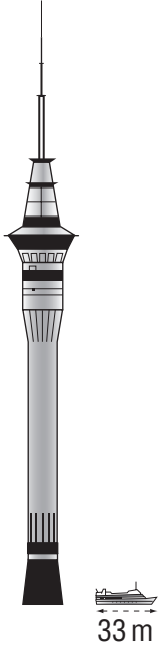**4** Angharad sleeps for 8 hours each night, correct to the nearest 10 minutes.
The total time she sleeps in the month of November (30 nights) is T hours.
Between what limits does T lie?

Answer .... $\leqslant T <$ .... [2]

5

The picture shows the Sky Tower in Auckland.
Alongside the tower is a boat. The boat is 33 metres long.
Use the length of the boat to estimate the height of the Sky Tower.

33 m

Answer ....m [2]

6

$$0.0008 \qquad 8 \times 10^{-5} \qquad 0.8\% \qquad \frac{1}{125\,000}$$

Write the numbers above in order, smallest first.

Answer .... < .... < .... < ....[2]

7 Find the value of *n* in each of the following statements.

(a) $32^n = 1$

Answer(a) n = ... [1]

(b) $32^n = 2$

Answer(b) n = ... [1]

(c) $32^n = 8$

Answer(c) n = ... [1]

4

8 The Canadian Maple Leaf train timetable from Toronto to Buffalo is shown below.

Toronto	10 30
Oakville	10 52
Aldershot	11 07
Grimsby	11 41
St Catharines	11 59
Niagra Falls	12 24
Buffalo	13 25

(a) How long does the journey take from Toronto to Buffalo?

Answer(a) .... h .... min [1]

(b) This journey is 154 kilometres. Calculate the average speed of the train.

Answer(b) .... km/h [2]

9 For each of the following sequences, write down the next term.

(a) 2, 3, 5, 8, 13, …

Answer(a) .... [1]

(b) x^6, $6x^5$, $30x^4$, $120x^3$, …

Answer(b) .... [1]

(c) 2, 6, 18, 54, 162, ...

Answer(c) .... [1]

1 Maria, Carolina and Pedro receive $800 from their grandmother in the ratio

Maria: Carolina: Pedro = 7:5:4.

(a) Calculate how much money each receives. [3]

(b) Maria spends $\frac{2}{7}$ of her money and then invests the rest for two years

at 5% per year simple interest.
How much money does Maria have at the end of the two years? [3]

(c) Carolina spends all of her money on a hi-fi set and two years later sells it at a loss of 20%.
How much money does Carolina have at the end of the two years? [2]

(d) Pedro spends some of his money and at the end of the two years he has $100.
Write down and simplify the ratio of the amounts of money Maria, Carolina and Pedro have at
the end of the two years. [2]

(e) Pedro invests his $100 for two years at a rate of 5% per year **compound interest**.
Calculate how much money he has at the end of these two years. [2]

1   Use a calculator to find the value of $\sqrt{(5.4(5.4-4.8)(5.4-3.4)(5.4-2.6))}$.

(a) Write down all the figures in your calculator display.

Answer(a) .... [1]

(b) Give your answer correct to 1 decimal place.

Answer(b) .... [1]

2   Use the formula

$$P = \frac{V^2}{R}$$

to calculate the value of P when $V = 6 \times 10^6$ and $R = 7.2 \times 10^8$.

Answer P = ... [2]

3

For the diagram, write down

(a) the order of rotational symmetry,

Answer(a) .... [1]

(b) the number of lines of symmetry.

Answer(b) .... [1]

4   When $0 < x < 0.9$, write the following in order of size with the **smallest** first.

$\cos x°$ x^2 x^{-1}

Answer .... < .... < .... [2]

5 $\dfrac{4c}{5} - \dfrac{3c}{35} = \dfrac{10}{7}$. Find c.

Answer c = ... [2]

6

$$p = \dfrac{0.002751 \times 3400}{(9.8923 + 24.7777)^2}.$$

(a) In the spaces provided, write each number in this calculation correct to 1 significant figure.

Answer(a) $\dfrac{\text{.....................} \times \text{.....................}}{(\text{.....................} + \text{.....................})^2}$

[1]

(b) Use your answer to **part (a)** to **estimate** the value of p.

Answer(b) .... [1]

8 **(a)** In October the cost of a car in euros was €20 000.
The cost of this car in pounds was £14 020.
Calculate the **exact** value of the exchange rate in October.

Answer(a) €1 = £ .... [1]

(b) In November the car still cost €20 000 and the exchange rate was €1 = £0.6915.
Calculate the difference, in pounds, between the cost in October and November.

Answer(b) £ .... [2]

1 Each year a school organises a concert.

(a) (i) In 2004 the cost of organising the concert was $385.

In 2005 the cost was 10% less than in 2004.

Calculate the cost in 2005. [2]

(ii) The cost of $385 in 2004 was 10% more than the cost in 2003.

Calculate the cost in 2003. [2]

(b) (i) In 2006 the number of tickets sold was 210.

The ratio

Number of adult tickets : Number of student tickets was 23 : 19.

How many adult tickets were sold? [2]

(ii) Adult tickets were $2.50 each and student tickets were $1.50 each.

Calculate the **total** amount **received** from selling the tickets. [2]

(iii) In 2006 the cost of organising the concert was $410.

Calculate the percentage profit in 2006. [2]

(c) In 2007, the number of tickets sold was again 210.

Adult tickets were $2.60 each and student tickets were $1.40 each.

The total amount received from selling the 210 tickets was $480.

How many student tickets were sold? [4]

1 Beatrice has an income of $40 000 in one year.

(a) She pays:

no tax on the first $10 000 of her income;

10 % tax on the next $10 000 of her income;

25 % tax on the rest of her income.

Calculate

(i) the total amount of tax Beatrice pays, [2]

(ii) the total amount of tax as a percentage of the $40 000. [2]

(b) Beatrice pays a yearly rent of $10 800.

After she has paid her tax, rent and bills, she has $12 000.

Calculate how much Beatrice spends on bills. [1]

(c) Beatrice divides the $12 000 between shopping and saving in the ratio

$$\text{shopping} : \text{saving} = 5 : 3.$$

(i) Calculate how much Beatrice spends on shopping in one year. [2]

(ii) What fraction of the original $40 000 does Beatrice **save**?

Give your answer in its lowest terms. [1]

(d) The rent of $10 800 is an increase of 25 % on her previous rent.

Calculate her previous rent. [2]

1

For the diagram above write down

(a) the order of rotational symmetry,

Answer(a) .... [1]

(b) the number of lines of symmetry.

Answer(b) .... [1]

2 Write down the next two prime numbers after 43.

Answer .... and .... [2]

3 Use your calculator to find the value of $\dfrac{(\cos30^{o})^{2}-(\sin30^{o})^{2}}{2(\sin120^{o})(\cos120^{o})}$.

Answer .... [2]

4 Simplify $\dfrac{5}{8}x^{\frac{3}{2}} \div \dfrac{1}{2}x^{-\frac{5}{2}}$.

Answer .... [2]

11

24 cm

18 cm | 18 cm

24 cm | 24 cm

NOT TO
SCALE

18 cm | 18 cm

24 cm | 24 cm

18 cm | 18 cm
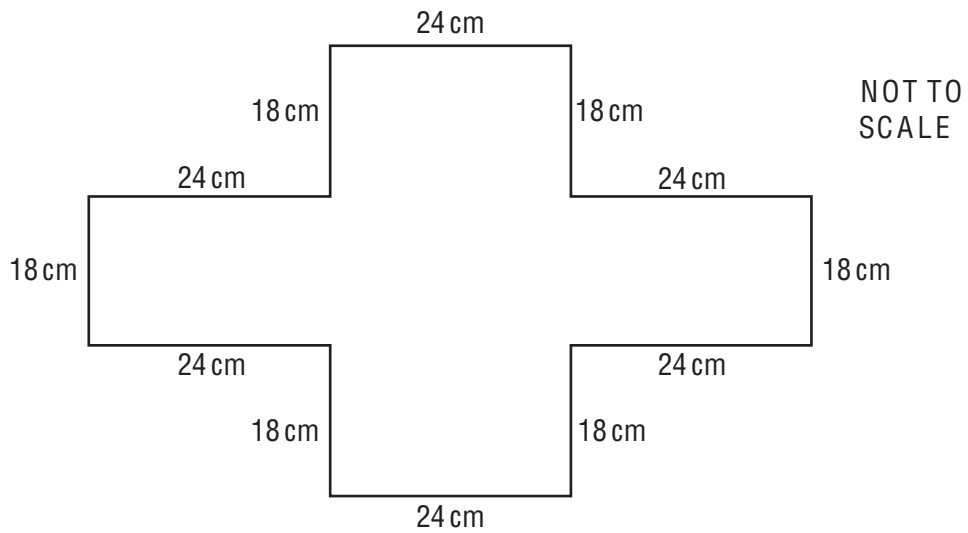
24 cm

Each of the lengths 24 cm and 18 cm is measured correct to the nearest centimetre.
Calculate the upper bound for the perimeter of the shape.

Answer .... cm [3]

5 In 1970 the population of China was 8.2×10^8.
In 2007 the population of China was 1.322×10^9.
Calculate the population in 2007 as a percentage of the population in 1970.

Answer .... %[2]

14 Zainab borrows $198 from a bank to pay for a new bed.
The bank charges compound interest at 1.9% per month.
Calculate how much **interest** she owes at the end of 3 months.
Give your answer correct to 2 decimal places.

Answer $ .... [3]

1 Chris goes to a shop to buy meat, vegetables and fruit.

    (a) **(i)** The costs of the meat, vegetables and fruit are in the ratio

              meat : vegetables : fruit = 2 : 2 : 3.

           The cost of the meat is $2.40.

           Calculate the **total** cost of the meat, vegetables and fruit.

Answer(a)(i) $ .... [2]

    (ii) Chris pays with a $20 note.

           What percentage of the $20 has he spent?

Answer(a)(ii) .... % [2]

    (b) The masses of the meat, vegetables and fruit are in the ratio

              meat : vegetables : fruit = 1 : 8 : 3.

           The total mass is 9 kg.

           Calculate the mass of the vegetables.

Answer(b) .... kg [2]

(c) Calculate the cost per kilogram of the fruit.

Answer(c) $ .... [3]

(d) The cost of the meat, $2.40, is an increase of 25% on the cost the previous week.

Calculate the cost of the meat the previous week.

Answer(d) $ .... [2]

8 Show that $\dfrac{7}{27} + 1\dfrac{7}{9} = 2\dfrac{1}{27}$.

Write down all the steps in your working.

Answer

[2]

---

9 When a car wheel turns once, the car travels 120 cm, correct to the nearest centimetre.

Calculate the lower and upper bounds for the distance travelled by the car when the wheel turns 20 times.

Answer lower bound .... cm

upper bound .... cm [2]

15 The air fare from Singapore to Stockholm can be paid for in Singapore dollars (S$) or Malaysian Ringitts (RM).
One day the fare was S$740 or RM1900 and the exchange rate was S$1= RM2.448 .

How much less would it cost to pay in Singapore dollars?
Give your answer in Singapore dollars correct to the nearest Singapore dollar.

Answer S$ .... [3]

16 Simplify

(a) $\left(\dfrac{16}{81}x^{16}\right)^{\frac{1}{2}}$,

Answer(a) .... [2]

(b) $\dfrac{16y^{10}\times 4y^{-4}}{32y^{7}}$.

Answer(b) .... [2]

17

	Boys	Girls	Total
Asia	62	28	
Europe	35	45	
Africa		17	
Total			255

For a small international school, the holiday destinations of the 255 students are shown in the table.

(a) Complete the table. [3]

(b) What is the probability that a student chosen at random is a girl going on holiday to Europe?

Answer(b) .... [1]

1 Write down the number which is 3.6 less than − 4.7 .

Answer .... [1]

2 A plane took 1 hour and 10 minutes to fly from Riyadh to Jeddah.
The plane arrived in Jeddah at 23 05.
At what time did the plane depart from Riyadh?

Answer .... [1]

3 Calculate $\sqrt[3]{2.35^2 - 1.09^2}$.
Give your answer correct to 4 decimal places.

Answer .... [2]

5 Show that $3\dfrac{3}{4} + 1\dfrac{1}{3} = 5\dfrac{1}{12}$.

Write down all the steps in your working.

Answer

[2]

---

6 Write the following in order of size, **smallest** first.

$$\dfrac{20}{41} \qquad \dfrac{80}{161} \qquad 0.492 \qquad 4.93\%$$

Answer .... $<$ .... $<$ .... $<$ .... [2]

---

7 In France, the cost of one kilogram of apricots is €3.38 .
In the UK, the cost of one kilogram of apricots is £4.39 .
£1 = €1.04 .
Calculate the difference between these prices.
Give your answer in pounds (£).

Answer £ .... [2]

---

8 A large rectangular card measures 80 centimetres by 90 centimetres.
Maria uses **all** this card to make small rectangular cards measuring 40 **millimetres** by
15 **millimetres**.
Calculate the number of small cards.

Answer .... [2]

---

1 **(a)** Hansi and Megan go on holiday.
The costs of their holidays are in the ratio   Hansi : Megan = 7 : 4.
Hansi's holiday costs $756.
Find the cost of Megan's holiday.

Answer(a) $ .... [2]

(b) In 2008, Hansi earned $7800.

(i) He earned 15% more in 2009.
Calculate how much he earned in 2009.

Answer(b)(i) $ .... [2]

(ii) In 2010, he earns 10% more than in 2009.
Calculate the percentage increase in his earnings from 2008 to 2010.

Answer(b)(ii) .... %   [3]

(c) Megan earned $9720 in 2009. This was 20% more than she earned in 2008.
How much did she earn in 2008?

Answer(c) $ .... [3]

(d) Hansi invested $500 at a rate of 4% per year **compound** interest.
Calculate the final amount he had after three years.

Answer(d) $ .... [3]

(b) A plane flies from London to Dubai and then to Colombo.
It leaves London at 01 50 and the total journey takes 13 hours and 45 minutes.
The local time in Colombo is 7 hours ahead of London.
Find the arrival time in Colombo.

Answer(b) .... [2]

(c) Another plane flies the 8710 km directly from London to Colombo at an average speed of 800 km/h.
How much longer did the plane in **part (b)** take to travel from London to Colombo?
Give your answer in hours and minutes, correct to the nearest minute.

Answer(c) .... h .... min [4]

2

1   Thomas, Ursula and Vanessa share $200 in the ratio

Thomas : Ursula : Vanessa = 3 : 2 : 5.

(a) Show that Thomas receives $60 and Ursula receives $40.

Answer(a)

[2]

(b) Thomas buys a book for $21.
What percentage of his $60 does Thomas have left?

Answer(b) .... % [2]

(c) Ursula buys a computer game for $36.80 in a sale.
The sale price is 20% less than the original price.
Calculate the original price of the computer game.

Answer(c) $ .... [3]

(d) Vanessa buys some books and some pencils.
Each book costs $12 **more** than each pencil.
The total cost of 5 books and 2 pencils is $64.20.
Find the cost of one pencil.

Answer(d) $ .... [3]

1 Work out $7 - 5 \times (6 - 1)$.

Answer .... [1]

---

2 Make h the subject of the formula $g = \sqrt{h + i}$.

Answer $h =$ .... [2]

---

3 Find the value of $\left(\dfrac{9}{4}\right)^{-\frac{3}{2}}$, giving your answer as an **exact fraction**.

Answer .... [2]

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4 **Showing all your working**, calculate $1\frac{1}{4} \div \frac{2}{3} - 1\frac{1}{3}$.

Answer .... [2]