

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

$$\text{spending : saving} = 7 : 8.$$

Calculate the amount Martha has for spending.

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Answer \$ [2]

- 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 $\left(\frac{27}{8}\right)^{-\frac{4}{3}}$.
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 $3^{-2} + 2^{-2} = \frac{13}{36}$.
Write down all the steps of your working.

Answer

[2]

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

Answer [2]

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

-2 2 1 -3 -1 -2 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]

- 11 Factorise completely.

$$p^2x - 4q^2x$$

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Answer [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.

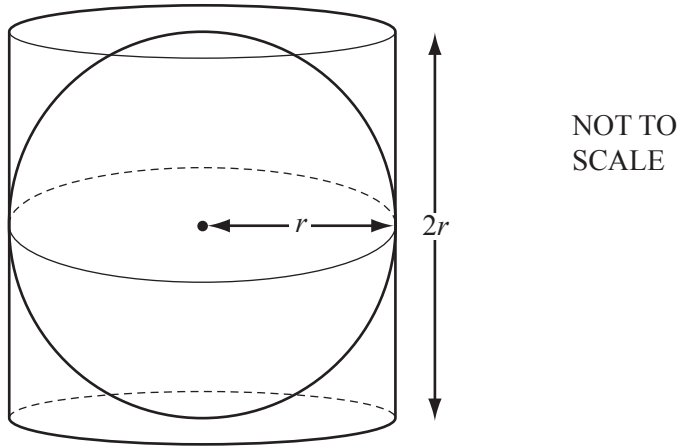
Answer ARS [3]

- 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]

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The sphere of radius r fits exactly inside the cylinder of radius r and height $2r$.
Calculate the percentage of the cylinder occupied by the sphere.

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

Answer % [3]

15

$$ap = px + c$$

Write p in terms of a , c and x .

Answer $p =$ [3]

- 16 The time, t , for a pendulum to swing varies directly as the **square root** of its length, l .
When $l = 9$, $t = 6$.

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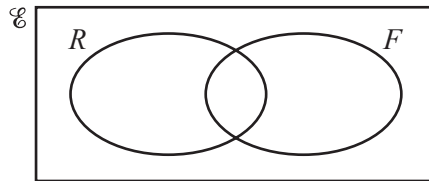
- (a) Find a formula for t in terms of l .

Answer(a) $t =$ [2]

- (b) Find t when $l = 2.25$.

Answer(b) $t =$ [1]

17



In the Venn diagram, $\mathcal{C} = \{\text{students in a survey}\}$, $R = \{\text{students who like rugby}\}$ and $F = \{\text{students who like football}\}$.

$$n(\mathcal{C}) = 20$$

$$n(R \cup F) = 17$$

$$n(R) = 13$$

$$n(F) = 11$$

- (a) Find

(i) $n(R \cap F)$,

Answer(a)(i) [1]

(ii) $n(R' \cap F)$.

Answer(a)(ii) [1]

- (b) A student who likes rugby is chosen at random.

Find the probability that this student also likes football.

Answer(b) [1]

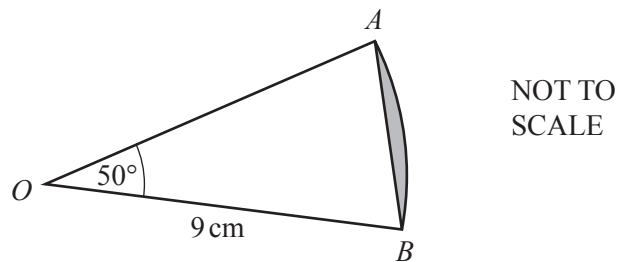
18 Write as a single fraction, in its simplest form.

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

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Answer [4]

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The diagram shows a sector AOB of a circle, centre O , radius 9 cm with angle $AOB = 50^\circ$.

Calculate the area of the segment shaded in the diagram.

Answer cm^2 [4]

20 (a) $\mathbf{N} = \begin{pmatrix} 2 \\ 6 \end{pmatrix}$. The order of the matrix \mathbf{N} is 2×1 .

$\mathbf{P} = (1 \ 3)$. The order of the matrix \mathbf{P} is 1×2 .

(i) Write down the order of the matrix \mathbf{NP} .

Answer(a)(i) [1]

(ii) Calculate \mathbf{PN} .

Answer(a)(ii) [1]

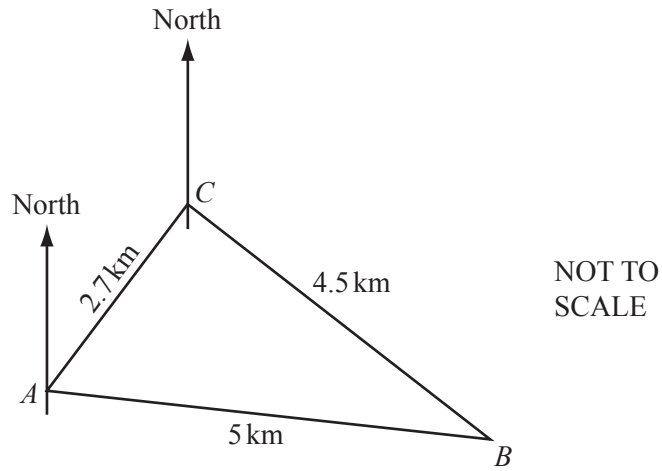
(b) $\mathbf{M} = \begin{pmatrix} 2 & 3 \\ 2 & 4 \end{pmatrix}$.

Find \mathbf{M}^{-1} , the inverse of \mathbf{M} .

Answer(b) $\mathbf{M}^{-1} =$ [2]

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The diagram shows 3 ships A , B and C at sea.

$AB = 5$ km, $BC = 4.5$ km and $AC = 2.7$ km.

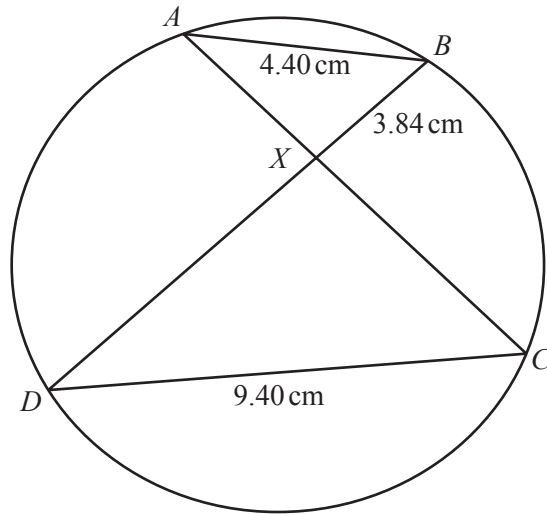
- (a) Calculate angle ACB .
Show all your working.

Answer(a) Angle $ACB =$ [4]

- (b) The bearing of A from C is 220° .

Calculate the bearing of B from C .

Answer(b) [1]



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A, B, C and D lie on a circle.
 AC and BD intersect at X .

- (a) Give a reason why angle BAX is equal to angle CDX .

Answer(a) [1]

- (b) $AB = 4.40$ cm, $CD = 9.40$ cm and $BX = 3.84$ cm.

- (i) Calculate the length of CX .

Answer(b)(i) $CX =$ cm [2]

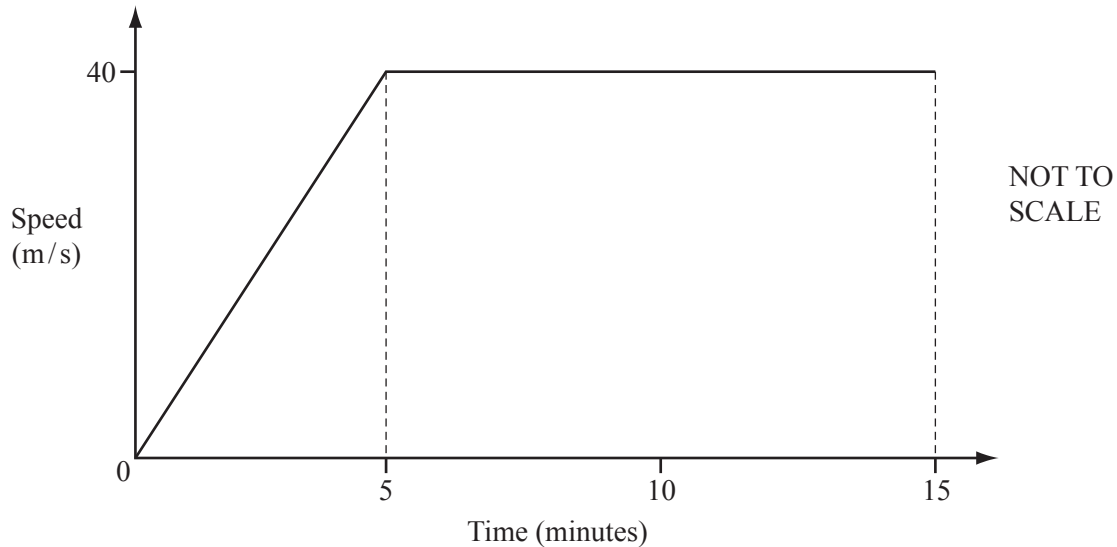
- (ii) The area of triangle ABX is 5.41 cm².

Calculate the area of triangle CDX .

Answer(b)(ii) cm² [2]

Question 23 is printed on the next page.

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The diagram shows the speed-time graph for the first 15 **minutes** of a train journey.
The train accelerates for 5 minutes and then continues at a constant speed of 40 metres/**second**.

- (a) Calculate the acceleration of the train during the first 5 minutes.
Give your answer in m/s^2 .

Answer(a) m/s^2 [2]

- (b) Calculate the average speed for the first 15 minutes of the train journey.
Give your answer in m/s .

Answer(b) m/s [3]

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