



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]

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3 Solve the simultaneous equations.

$$\begin{aligned}x + 5y &= 22 \\x + 3y &= 12\end{aligned}$$

Answer  $x =$  .....

$y =$  ..... [2]

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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.

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

Answer ..... [3]

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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]

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

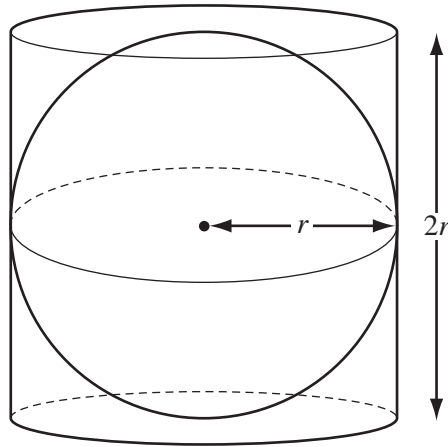
Calculate his mass before the race.

Answer ..... kg [3]

---

6

14



NOT TO  
SCALE

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]

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

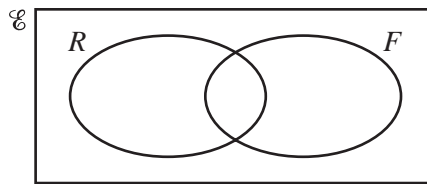
(a) Find a formula for  $t$  in terms of  $l$ .

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

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

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

17



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

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

$n(R \cup F) = 17$

$n(R) = 13$

$n(F) = 11$

(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.

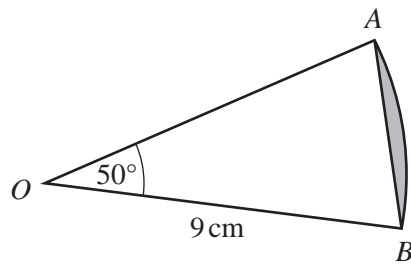
Answer(b) ..... [1]

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

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

Answer ..... [4]

19



NOT TO  
SCALE

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<sup>2</sup> [4]



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

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

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

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

(ii) Calculate  $\mathbf{PN}$ .

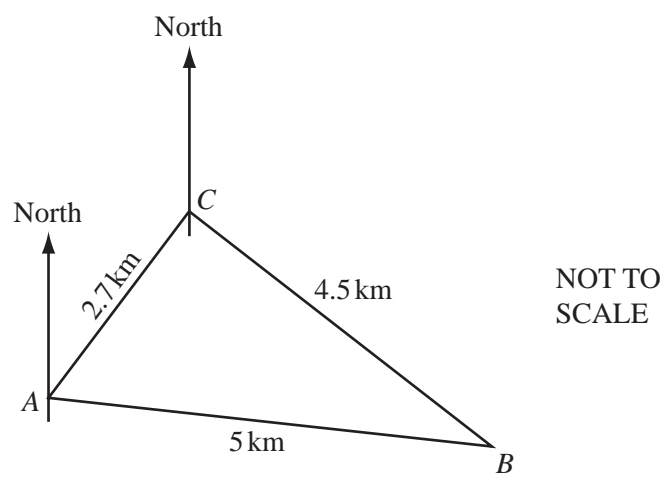
Answer(a)(ii) [1]

(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.

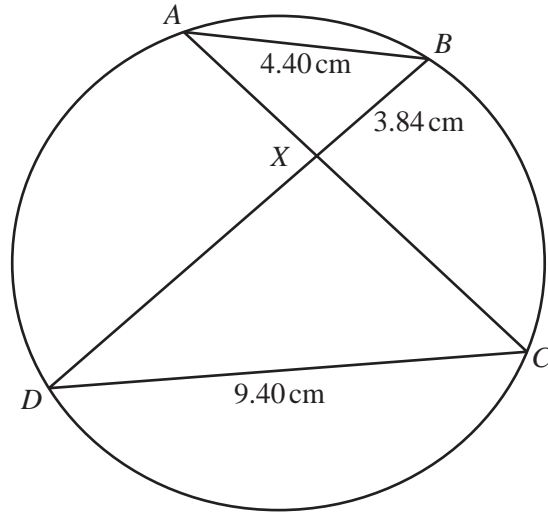
$AB = 5$  km,  $BC = 4.5$  km and  $AC = 2.7$  km.

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

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

- (b) The bearing of  $A$  from  $C$  is  $220^\circ$ .  
Calculate the bearing of  $B$  from  $C$ .

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



NOT TO  
SCALE

$A, B, C$  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  $CX$ .

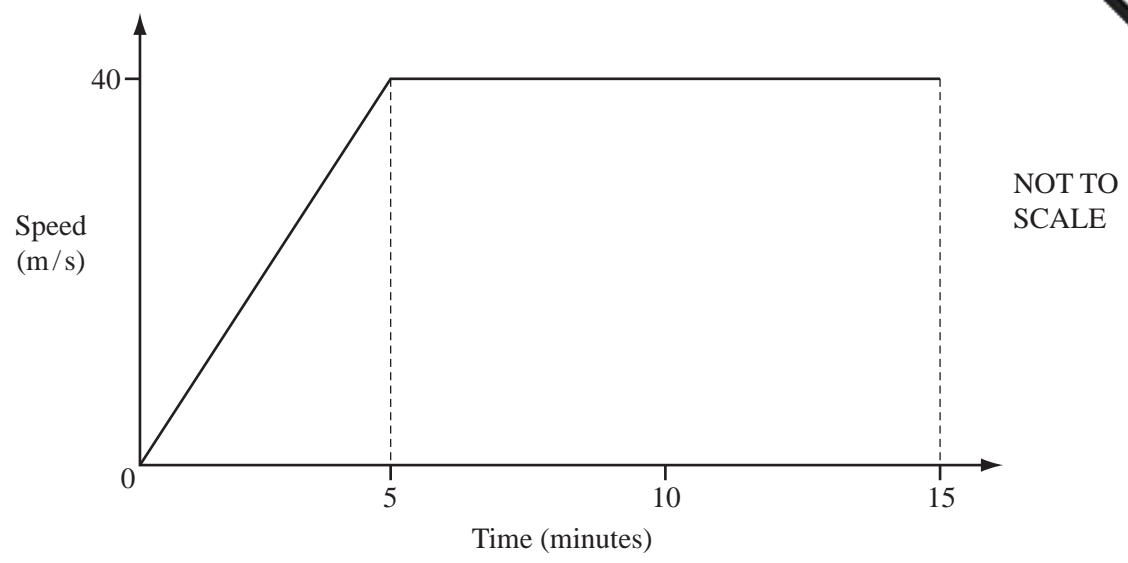
Answer(b)(i)  $CX =$  ..... cm [2]

- (ii) The area of triangle  $ABX$  is  $5.41$  cm<sup>2</sup>.

Calculate the area of triangle  $CDX$ .

Answer(b)(ii) ..... cm<sup>2</sup> [2]

23



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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