



ANSWER IN SPACES PROVIDED (SHOW ALL NECESSARY WORKING OUT)

- 1 The cost of buying pre mixed concrete is given in the table below.

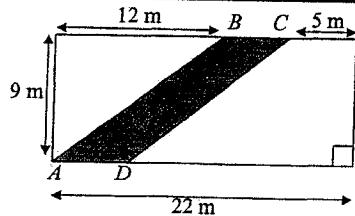
CONCRETE COSTS
\$30 delivery fee plus
\$127 per cubic metre

Christian paid \$474.50 for concrete.

How many cubic metres did he receive?

2. A country has a population of 8.3 million. This number increases at a rate of 25 thousand per year for six years. What is the population at the end of the six years?

3.

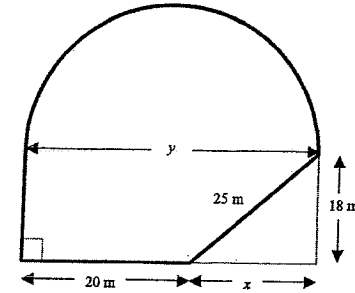


NOT TO SCALE

$ABCD$ is a parallelogram formed inside a rectangle with length 22 metres and width 9 metres.

Find the perimeter, in metres, of the parallelogram $ABCD$.

4



The diagram above represents the cross section of an indoor hall that is being built. The diagram could be described as being a semi-circle joined to a trapezium.

- (a) Use Pythagoras' Theorem to find the length x to the nearest centimetre.

- (b) CIRCLE your answer A, B, C or D to the following in the space provided.

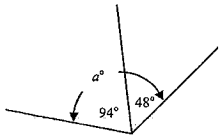
The area of the semicircle, to the nearest square metre, is closest to

- (A) 548 m^2
- (B) 1096 m^2
- (C) 2191 m^2
- (D) 4382 m^2

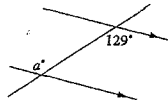
- (c) Find the area of the entire shape.

5. Find the value of the pronumerals for the following. Give reasons.

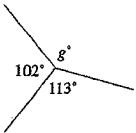
(a)



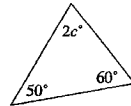
(d)



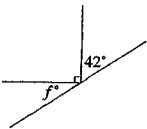
(b)



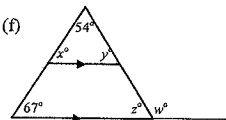
(e)



(c)



(f)



6. Expand and simplify if possible

(a) $4(3x - 5) + 2$

7. Factorise the following

(a) $3x + 6$

(b) $7(12y + 8) - 3(10y - 8)$

(b) $6x^2 + 5x + 1$

(c) $(2x - 4)^2$

(c) Factorise and simplify

$$\frac{a^2 - 3a - 10}{a^2 - a - 6} + \frac{a^2 - 7a + 10}{a^2 - 4}$$

(d) $(3b - 4a^3)(3b + 4a^3)$

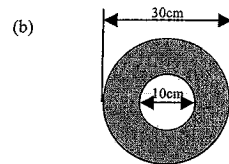
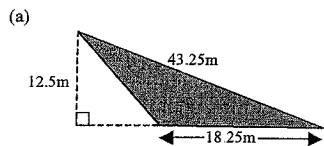
(e) $\left(\frac{3x^2}{2} + 4x\right)^2$

8. Michelle works as a bank accountant and is paid an hourly rate of \$18.40 per hour for a 35-hour week.
- (a) Find Michelle's normal weekly wage
- (b) Michelle is paid a holiday loading of 17.5%. Calculate the total amount that Michelle is paid for her 4 weeks holiday

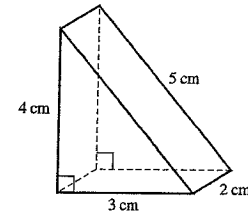
9. Mr and Mrs Casey have signed a hire purchase agreement to buy a dining room and lounge suite priced at \$8500. The agreement requires a payment of \$2000 cash followed by a monthly payment of \$150 over a five year period

- (a) What is the actual price paid for the suites?
- (b) What is the annual interest rate charged? (To nearest 1%)

10. Calculate the area of the following figures.



11. For the triangular prism shown below, find:



- (a) the surface area

- (b) the volume

12. (a) Determine the surface area of a cylinder with one end whose radius is 5.3 cm and height is 3.5 cm. (Answer correct to 2 decimal places.)

- (b) Determine the volume of the cylinder in (a) correct to 2 decimal places.

13. Solve the equations:

(a) $2x - 1 = 13$.

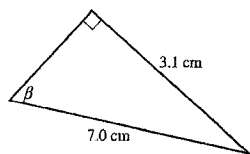
(b) $\frac{x-11}{4} = 10$

(c) $\frac{2}{7(x+3)} = \frac{1}{(x-2)}$

(d) Find a certain number which when added to 34 is equal to 200 less twice the certain number.

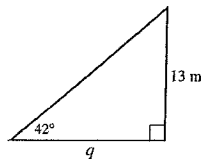
14

Find the value of β correct to the nearest minute.



15

Find length q correct to 1 decimal place.



16.

Cem was in a boat observing a lighthouse on a vertical cliff at an angle of elevation of 54° . The cliff was 94m high. Calculate the horizontal distance from Cem to the base of the cliff

17. A plane leaves an airport and flies 900 km on a bearing of 145° .

(a) How far south of the airport is the plane (to the nearest km)?

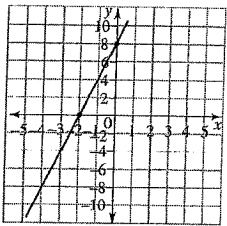
(b) What is the three-figure bearing of the airport from the plane?

18.

- (a) Make a table of values and plot a graph for

$$y = -2x + 5$$

- (b) Find the gradient and y -intercept for the graph below and hence find its equation.



y -intercept =

gradient =

equation:

(c)

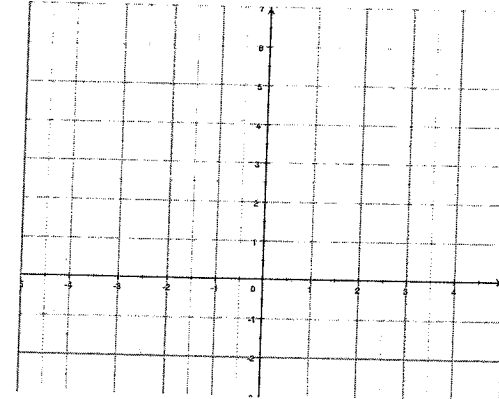
- (i) **SKETCH** a line, which has an x -intercept of 3 and a y -intercept of 6:

- (ii) Find the equation of the above line.

19.

$X(-3, 1)$, $Y(2, -1)$ and $Z(-1, 6)$ are 3 points on the number plane.

Plot these points on a number plane.



- (a) Find the exact distance of the interval XZ . (d) Prove that the lines XM and MY are perpendicular to each other.

- (b) Find the point M , the midpoint of the interval YZ . Plot M on the number plane.

- (c) Find the gradient of the line XM .



97

Term 4, 2008 Friday 21st November 2008

ANSWER IN SPACES PROVIDED (SHOW ALL NECESSARY WORKING OUT)

1 The cost of buying pre mixed concrete is given in the table below.

CONCRETE COSTS
\$30 delivery fee plus
\$127 per cubic metre

$$\begin{array}{r}
 \$ 474.50 - \\
 \$ 30.00 \\
 \hline
 \$ 444.50 \quad \checkmark
 \end{array}$$

Christian paid \$474.50 for concrete.

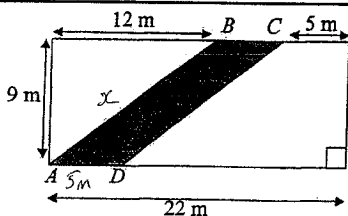
How many cubic metres did he receive?

$$\begin{aligned}
 & \$444.50 \div 127 = 3.5 \\
 & \therefore \text{Received } 3.5 \text{ m}^3 \text{ of concrete} \quad \checkmark
 \end{aligned}$$

2 A country has a population of 8.3 million. This number increases at a rate of 25 thousand per year for six years. What is the population at the end of the six years?

$$\begin{aligned}
 25000 \times 6 \text{ yrs} &= 150000 \quad \checkmark \\
 &+ 8300000 \\
 \hline
 &8450000 \quad \checkmark
 \end{aligned}$$

3.



NOT TO SCALE

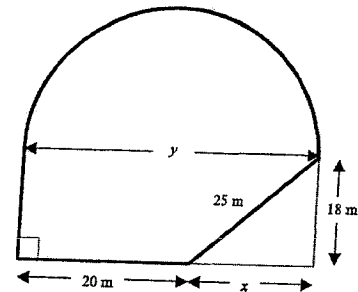
ABCD is a parallelogram formed inside a rectangle with length 22 metres and width 9 metres.

Find the perimeter, in metres, of the parallelogram ABCD.

$$\begin{aligned}
 x^2 &= 9^2 + 12^2 \\
 x^2 &= 81 + 144 \\
 x^2 &= 225 \\
 \therefore x &= 15 \text{ m} \quad \checkmark
 \end{aligned}$$

$$\begin{aligned}
 P &= (2 \times 15) + (2 \times 5) \\
 &= 30 + 10 \\
 &= 40 \text{ m} \quad \checkmark
 \end{aligned}$$

4.



The diagram above represents the cross section of an indoor hall that is being built. The diagram could be described as being a semi-circle joined to a trapezium.

(a) Use Pythagoras' Theorem to find the length x to the nearest centimetre.

$$\begin{aligned}
 25^2 &= x^2 + 18^2 \quad \checkmark \\
 \therefore x &= 17.3493 \text{ m} \\
 x &= 17.35 \text{ m} \quad \checkmark
 \end{aligned}$$

(b) CIRCLE your answer A, B, C or D to the following in the space provided.

The area of the semicircle, to the nearest square metre, is closest to

- (A) 548 m²
- (B) 1096 m²
- (C) 2191 m²
- (D) 4382 m²

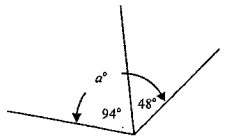
(c) Find the area of the entire shape.

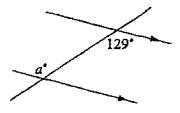
$$\begin{aligned}
 A &= 1096 + \frac{1}{2} (20 + 17.35) \times 18 \quad \checkmark \\
 &= 1096 + 516.14 \\
 &= 1612.14 \text{ m}^2
 \end{aligned}$$

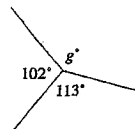
(h)

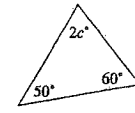
(5)

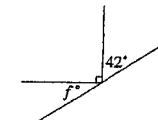
5. Find the value of the pronumerals for the following. Give reasons.

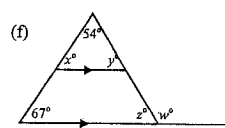
(a) 
 $a = 94 + 48$ (Adjacent \angle 's)
 $\therefore a = 142^\circ$ ✓

(d) 
 $a = 129^\circ$ (Alternate \angle 's) ✓

(b) 
 $g + 102 + 113 = 360$ (\angle 's at a point) ✓
 $g + 215 = 360$
 $g = 145^\circ$ ✓

(e) 
 $2c + 50 + 60 = 180$ (Δ sum of $\Delta = 180^\circ$)
 $2c + 110 = 180$ ✓
 $2c = 70$
 $c = 35^\circ$ ✓

(c) 
 $f + 90 + 42 = 180$ (\because straight \angle 's) ✓
 $f + 132 = 180$
 $f = 48^\circ$ ✓

(f) 
 $x = 67^\circ$ (\because corresponding \angle 's) $\frac{1}{2}$
 $w = 54 + 67$ (\because ext \angle of $\Delta =$ sum of opp int \angle 's) $\frac{1}{2}$
 $w = 121^\circ$
 $z = 180 - 121$ (supp \angle 's) $\frac{1}{2}$
 $z = 59^\circ$
 $v = 59^\circ$ (\because converse \angle 's) \perp

6. Expand and simplify if possible

(a) $4(3x-5)+2$
 $= 12x - 20 + 2$ ✓
 $= 12x - 18$ ✓

7. Factorise the following

(a) $3x+6$
 $= 3(x+2)$ ✓

(b) $7(12y+8)-3(10y-8)$
 $= 84y + 56 - 30y + 24$ ✓
 $= 54y + 80$ ✓

(b) $6x^2+5x+1$ $P=6$
 $\frac{(6x+3)(6x+2)}{6}$ ✓ $S=+5$
 $= \frac{3(2x+1) \cdot 2(3x+1)}{6}$ ✓ $F=3, 2$
 $= (2x+1)(3x+1)$ ✓

(c) $(2x-4)^2$
 $= 4x^2 - 16x + 16$ ✓✓

(c) Factorise and simplify

$\frac{a^2-3a-10}{a^2-a-6} + \frac{a^2-7a+10}{a^2-4}$
 $\frac{1}{2} \sqrt{\frac{(a-5)(a+2)}{(a-3)(a+2)} \times \frac{(a+2)(a-2)}{(a-5)(a-2)}} \frac{1}{2}$ ✓
 $= \frac{a+2}{a-3}$ ✓ 1

(d) $(3b-4a^3)(3b+4a^3)$
 $= (3b)^2 - (4a^3)^2$ ✓
 $= 9b^2 - 16a^6$ ✓

(e) $(\frac{3x^2}{2} + 4x)^2$
 $= (\frac{3x^2}{2})^2 + 2(\frac{3x^2}{2})(4x) + (4x)^2$ ✓
 $= \frac{9x^4}{4} + 12x^3 + 16x^2$ ✓

(10)

8. Michelle works as a bank accountant and is paid an hourly rate of \$18.40 per hour for a 35-hour week.

(a) Find Michelle's normal weekly wage.

$$35 \times \$18.40 \\ = \$644 \quad \checkmark$$

(b) Michelle is paid a holiday loading of 17.5%. Calculate the total amount that Michelle is paid for her 4 weeks holiday

$$4 \times \$644 \times 117.5\% \\ = \$3026.80 \# \quad \checkmark$$

9.

Mr and Mrs Casey have signed a hire purchase agreement to buy a dining room and lounge suite priced at \$8500. The agreement requires a payment of \$2000 cash followed by a monthly payment of \$150 over a five year period.

(a) What is the actual price paid for the suites?

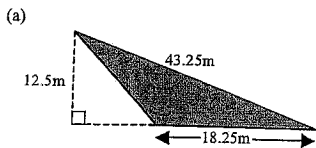
$$= \$2000 + (12 \times 150 \times 5) \checkmark \\ = \$2000 + \$9000 \\ = \$11000 \# \quad \checkmark$$

(b) What is the annual interest rate charged? (To nearest 1%)

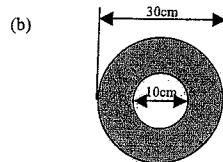
$$\text{Interest} = \$11000 - \$8500 \\ = \$2500 \quad (5 \text{ yrs}) \quad \checkmark$$

$$\therefore \left(\frac{2500}{8500}\right) \times 100 \div 5 = 5.8\% = 6\% \quad \checkmark$$

10. Calculate the area of the following figures.



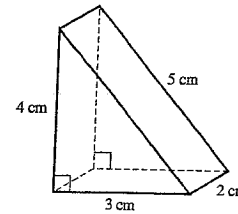
$$A = \frac{1}{2} \times 12.5 \times 18.25 \\ = 114.06 \text{ m}^2 \quad \checkmark$$



$$A = \pi(15)^2 - \pi(5)^2 \quad \checkmark \\ = 628.32 \text{ cm}^2 \quad \checkmark$$

(11)

11 For the triangular prism shown below, find:



(a) the surface area

$$A = 2\left(\frac{1}{2} \times 3 \times 4\right) + (3 \times 2) + (2 \times 5) + (4 \times 2) \\ = 12 + 6 + 10 + 8 \\ = 36 \text{ cm}^2 \quad \checkmark \quad \textcircled{3}$$

(b) the volume

$$V = \left(\frac{1}{2} \times 3 \times 4\right) \times 2 \\ = 12 \text{ cm}^3 \quad \checkmark \quad \textcircled{2}$$

12

(a) Determine the surface area of a cylinder with one end whose radius is 5.3 cm and height is 3.5 cm. (Answer correct to 2 decimal places)

$$A = 2\pi r^2 + 2\pi r h \\ = 2 \times \pi \times 5.3^2 + 2 \times \pi \times 5.3 \times 3.5 \\ = 293.05 \text{ cm}^2 \quad \checkmark$$

(2)

(b) Determine the volume of the cylinder in (a) correct to 2 decimal places.

$$V = \pi r^2 h \\ = \pi \times (5.3)^2 \times 3.5 \\ = 308.87 \text{ cm}^3 \quad \checkmark$$

(8)

13 Solve the equations:

(a) $2x - 1 = 13$

$+1 \quad +1$

$2x = 14$

$x = 7$ ✓

(b) $\frac{x-11}{4} = 10$

$x-11 = 40$ ✓

$x = 51$ ✓

(c) $\frac{2}{7(x+3)} \times \frac{1}{(x-2)}$

$2x - 4 = 7x + 21$ ✓

$-25 = 5x$ ✓

$x = -5$ ✓

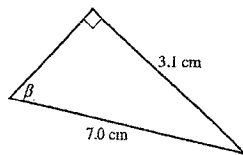
(d) Find a certain number which when added to 34 is equal to 200 less twice the certain number.

$x + 34 = 2x - 200$ ✓

$234 = x$ ✓

14

Find the value of β correct to the nearest minute.



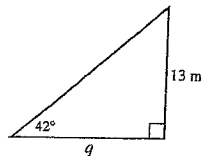
$\sin \beta = \frac{3.1}{7}$ ✓

$\beta = \sin^{-1}\left(\frac{3.1}{7}\right)$

$\beta = 26^{\circ} 17'$ ✓

15

Find length q correct to 1 decimal place.



$\tan 42 = \frac{13}{q}$ ✓

$q \tan 42 = 13$

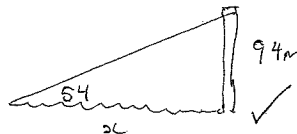
$q = \frac{13}{\tan 42}$

$q = 14.4 \text{ m}$

(12)

16.

Cem was in a boat observing a lighthouse on a vertical cliff at an angle of elevation of 54° . The cliff was 94m high. Calculate the horizontal distance from Cem to the base of the cliff.



$\tan 54 = \frac{94}{x}$ ✓

$x \tan 54 = 94$

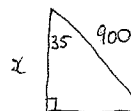
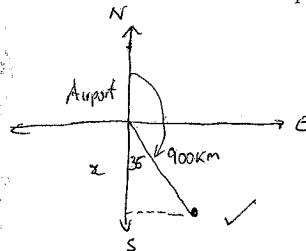
$x = \frac{94}{\tan 54}$

$x = 68.3 \text{ m}$ ✓

(3)

17. A plane leaves an airport and flies 900 km on a bearing of 145° .

(a) How far south of the airport is the plane (to the nearest km)?



$\cos 35 = \frac{x}{900}$ ✓

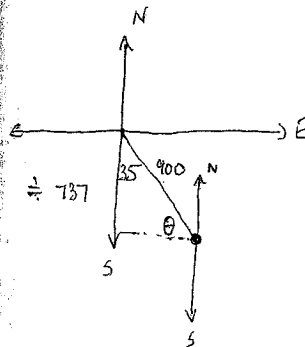
$x = 900 \cos 35$

$x = 737.24$ ✓

$= 737 \text{ km (nearest km)}$

(3)

(b) What is the three-figure bearing of the airport from the plane?



$\theta = 90 - 35$ (\because sum of $\Delta = 180^{\circ}$)

$\theta = 55^{\circ}$ ✓

\therefore bearing of airport from plane

$270 + 55$

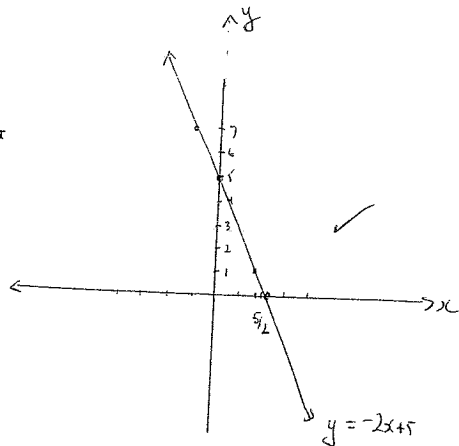
(2)

18.

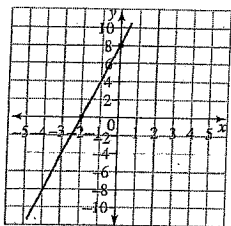
(a) Make a table of values and plot a graph for

$$y = -2x + 5$$

x	-1	0	1
y	7	5	3



(b) Find the gradient and y-intercept for the graph below and hence find its equation.



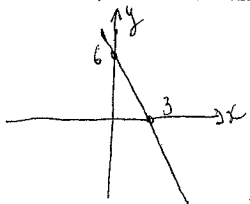
y-intercept = 8 ✓

gradient = $+\frac{8}{2} = 4$ ✓

equation:

$$y = 4x + 8$$

(c) (i) SKETCH a line, which has an x-intercept of 3 and a y-intercept of 6:



(ii) Find the equation of the above line.

$$m = -\frac{6}{3} = -2$$

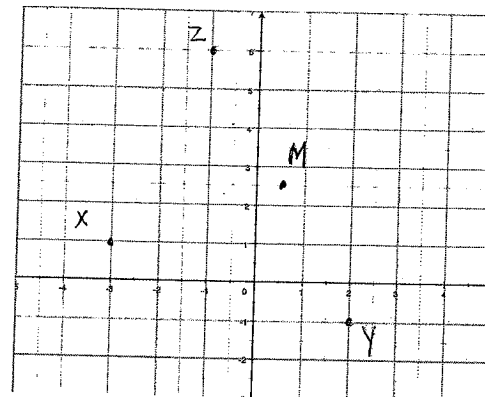
$$y - 6 = -2(x - 3)$$

$$\therefore y = -2x + 6$$

19.

X(-3, 1), Y(2, -1) and Z(-1, 6) are 3 points on the number plane.

Plot these points on a number plane.



(a) Find the exact distance of the interval XZ.

$$\begin{matrix} x_1 & y_1 & x_2 & y_2 \\ X(-3, 1) & & Z(-1, 6) \end{matrix}$$

$$\begin{aligned} D &= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \\ &= \sqrt{(-3 - (-1))^2 + (1 - 6)^2} \\ &= \sqrt{4 + 25} \\ &= \sqrt{29} \end{aligned}$$

(b) Find the point M, the midpoint of the interval YZ. Plot M on the number plane.

$$\begin{aligned} \text{Midpoint} &= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \\ &= \left(\frac{2 + (-1)}{2}, \frac{-1 + 6}{2} \right) \end{aligned}$$

$$\therefore M = \left(\frac{1}{2}, \frac{5}{2} \right)$$

(c) Find the gradient of the line XM.

$$X(-3, 1) \quad M\left(\frac{1}{2}, \frac{5}{2}\right)$$

$$\begin{aligned} m_{XM} &= \frac{y_2 - y_1}{x_2 - x_1} = \frac{\frac{5}{2} - 1}{\frac{1}{2} - (-3)} \\ &= \frac{\frac{3}{2}}{\frac{7}{2}} = \frac{3}{7} \end{aligned}$$

(d) Prove that the lines XM and MY are perpendicular to each other.

If line XM is \perp to MY

$$m_{XM} \times m_{MY} = -1$$

$$m = \left(\frac{1}{2}, \frac{5}{2} \right)$$

$$Y = (2, -1)$$

Now m_{MY}

$$= \frac{5/2 - (-1)}{1/2 - 2}$$

$$= \frac{7/2}{-3/2}$$

$$= -\frac{7}{3}$$

$$= -\frac{7}{3} \times \frac{3}{7} = -1$$

$$\therefore m_{MY} = -\frac{7}{3}$$

$$m_{XM} \times m_{MY}$$

$$= \frac{3}{7} \times -\frac{7}{3} = -1$$