1. [4 marks]

Robert and Debbie own a business where the profits are distributed in the ratio of 3 : 5. How should the profit of $21360 be shared?

$3:5$

$\frac{3}{8}:\frac{5}{8}$ ✓✓ (4)

Robert $\frac{3}{8} \times 21360 = \$8010$

Debbie $\frac{5}{8} \times 21360 = \$13350$

Robert gets $8010 ✓, Debbie gets $13350 ✓.

2. [2, 3, = 5 marks]

Mr XTC can perform 2400 mathematical calculations in 3 hours and 20 minutes. (Use MC as an abbreviation for mathematical calculations)

a. Express this as a simple rate

2400 mc / 3 hr 20 min
2400 mc / 200 min
12 mc / min (2)

✓ ✓
12 mc / minute OR 720 mc / hour

b. How long will it take Mr XTC to perform 10,620 MCs? Express your answer in hours and minutes.

$\frac{10620}{12} = 885$ mins ✓

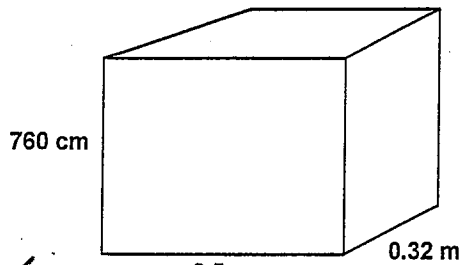
$\frac{885}{60} = 14{:}75$ hours ✓ (3)

Answer: 14 hours 45 mins ✓

3. [3, 2 = 5 marks]

If the density of plastic is 1.5 gm/cm^3,

a. What is the mass of the following block of plastic?
(Express your answer in kilograms)



50 cm 32cm

$d = \frac{m}{V}$

$m = d \times V$

$= 1.5 \times 50 \times 32 \times 760$ ✓

$= 1824000g$ ✓

$= 1824\ kg$ ✓

(3)

b. If the block was made of a different material, that had a density 15% less than plastic, what would be the mass?
(Express your answer in kilograms)

$1824 \times \frac{85}{100} = 1550.4\ kg$ ✓ ✓

(2)

4. [3 marks]

A real estate agent is paid $240 per week and receives 3.5% commission on sales. Calculate his weekly pay if he sells property worth $750,280 in that week.

$pay = 240 + \left(\frac{3.5}{100} \times 750280\right)$ ✓

$= 240 + 26259.8$ ✓

$= \$\ 26499.80$ ✓

(3)

5. [4 marks]

Mr Moneybags invested $145,000 over 3 years and received a total of $26,100 in simple interest. What annual interest rate was he receiving?

$$SI = \frac{PRT}{100}$$

$$R = \frac{SI \times 100}{PT} \checkmark$$

$$= \frac{26100 \times 100}{145000 \times 3} \checkmark\checkmark$$

$$= 6\% \checkmark$$

4

6. [5 marks]

Sneaky Sam, the moneylender lends Shirley $15,000 at the rate of 11% per annum compounding daily. Find the amount of interest that needs to be paid in a non-leap year if the loan is paid off after 100 days.

$P = 15000$
$R = 11$
$n = 365$
$t = \frac{100}{365}$

$$A = P\left(1 + \frac{R}{100n}\right)^{nt} \checkmark$$

$$= 15000\left(1 + \frac{11}{100 \times 365}\right)^{365 \times \frac{100}{365}} \checkmark$$

$$= 15000\left(1 + \frac{11}{36500}\right)^{100} \checkmark$$

$$= 15458.86534$$

$$\approx \$15458.87 \checkmark$$

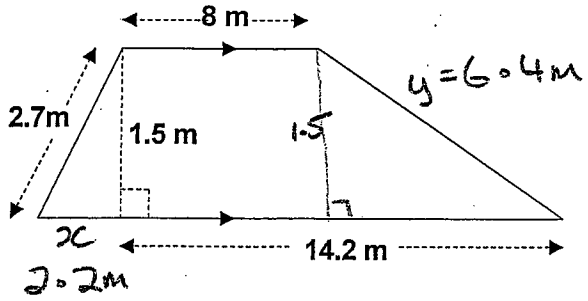
$$\text{Interest} = \$458.87 \checkmark$$

5

7. [8, 2 = 10 marks]

For the following shape,

a. Find the perimeter (accurate to 1 decimal place)



6

$x = \sqrt{2.7^2 - 1.5^2}$ ✓

$= 2.244999 \approx 2.2$ ✓

$y = \sqrt{1.5^2 + 6.2^2}$ ✓

$= 6.37887 \approx 6.4$ ✓

$P = 8 + 6.4 + 14.2 + 2.2 + 2.7$

$= 33.5\text{m}$

Perimeter = 33.5 m ✓✓

b. Find the area (accurate to 1 decimal place)

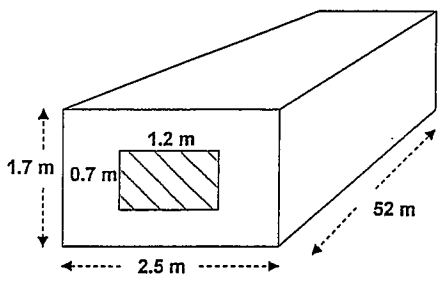
2

Trapezium $A = \frac{(8 + 14.2 + 2.2) \times 1.5}{2}$ ✓

$= 18.3\text{m}^2$ ✓

8. [4 marks]

The following rectangular pipe is constructed of cement and has a hollow rectangular centre. Find the volume of cement required to make it. (accurate to 2 decimal places)



4

$V = (1.7 \times 2.5 \times 52)$ ✓

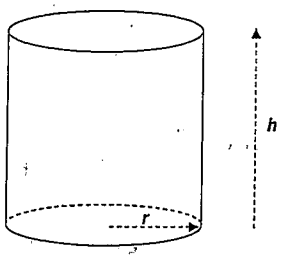
$- (0.7 \times 1.2 \times 52)$ ✓

$= 177.32\text{m}^3$ ✓✓

9. [2, 3, 2 = 7 marks]

A given cylinder has a height h and radius r, and has a top and bottom.

a. Write the formula to calculate the total surface area of the cylinder



(2)

$SA = 2\pi r^2 + 2\pi rh$ ✓✓

OR $SA = 2\pi r(r+h)$

b. Transpose the formula to make h the subject

(3)

$SA = 2\pi r^2 + 2\pi rh$

$SA - 2\pi r^2 = 2\pi rh$ ✓

$\frac{SA - 2\pi r^2}{2\pi r} = h$ ✓✓

$h = \frac{SA - 2\pi r^2}{2\pi r}$ OR $h = \frac{SA}{2\pi r} - r$

c. Calculate the height of a cylinder that has a total surface area of 170 m^2 and radius of 3 m. (accurate to 2 decimal places)

(2)

$h = \frac{SA - 2\pi r^2}{2\pi r}$

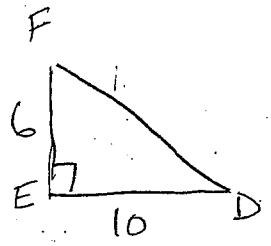
$= \frac{(170 - 2\pi 3^2)}{2\pi 3}$ ✓

$= 6.02m$ ✓

10. [5, 3 = 8marks]

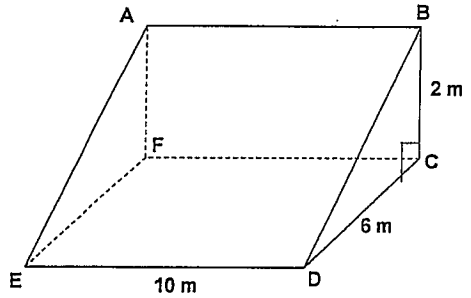
For the following rectangular-based wedge

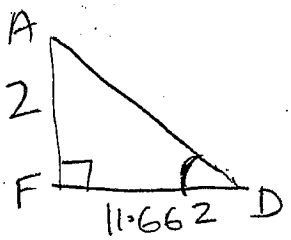
a. Find the angle that the line AD makes with DF. (accurate to 2 decimal places)



$FD = \sqrt{6^2 + 10^2}$

$= 11.662\text{m}$ ✓✓





$\tan^{-1}\left(\frac{2}{11.662}\right)$ ✓✓

$= 9.73°$ ✓

5

b. Find the distance from E to B. (accurate to 2 decimal places)

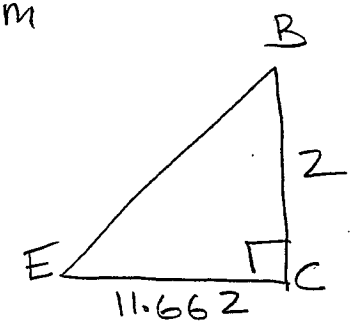
$EC = FD = 11.662\text{ m}$

$EB = \sqrt{11.662^2 + 2^2}$ ✓

$= 11.8322$ ✓

$\approx 11.83\text{m}$ ✓

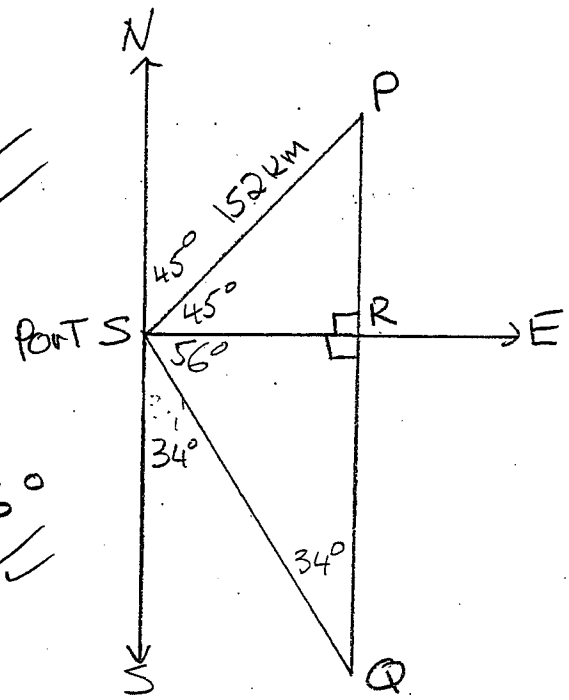
3



11. [6, 2 = 8 marks]

Two ships P and Q leave the same port at the same time. Ship P sails on a course NE while Q sails S 34° E. After two hours, both ships stopped, and P had sailed 152 km and is now due north of Q. (Hint: draw a diagram)

a. Find the distance from P to Q. (accurate to 1 decimal place)



Find PR

$\sin 45 = \frac{PR}{152}$

$PR = 152 \sin 45$

$= 107.48$ km ✓✓

$SR = 107.48$ km

Find RQ

$\tan 56° = \frac{RQ}{107.48}$

$RQ = 107.48 \tan 56°$

$= 159.35$ km ✓✓

Find PQ

$PQ = PR + RQ$

$= 107.48 + 159.35$

$= 266.83$

≈ 266.8 km ✓✓

6

b. How far has Q sailed? (accurate to 1 decimal place)

$\cos 56° = \frac{107.48}{SQ}$ ✓

$SQ = \frac{107.48}{\cos 56°}$

$= 192.2$ km ✓

2

12. [2, 4, 2, 4 = 12 marks]

Completely factorize the following

a. $x^2 - 12x + 36$

$= (x - 6)(x - 6)$ ✓✓

$= (x - 6)^2$

b. $6x^2 + 17x + 5$ (30)

$= \frac{(6x + 15)(6x + 2)}{6}$ ✓✓

$= (2x + 5)(3x + 1)$ ✓✓

c. $(m - 5)^2 - t^2$

$= (m - 5 - t)(m - 5 + t)$ ✓✓

d. $5x^2 - 5y^2 + 6x - 6y$

$= 5(x^2 - y^2) + 6(x - y)$ ✓

$= 5(x - y)(x + y) + 6(x - y)$ ✓

$= (x - y)[5(x + y) + 6]$ ✓✓

12

13. [3, 3 = 6 marks]

Solve the following equations

a. $\frac{4x-1}{2} = \frac{7x-3}{3}$

$3(4x-1) = 2(7x-3)$ ✓

$12x-3 = 14x-6$ ✓

$2x = 3$

$x = \frac{3}{2}$ ✓

b. $\frac{4x-3}{-5} > 3$

$4x-3 < -15$ ✓

$4x < -12$ ✓

$x < -3$ ✓

6

14. [2, 3 = 5 marks]

Simplify the following

a. $-pq \times 2pr^2 \times 5p^2r \times 3p^4q$

$= -30p^8q^2r^3$ ✓✓

b. $\frac{3x}{x-3} - \frac{2x}{x-2}$

$= \frac{3x(x-2) - 2x(x-3)}{(x-3)(x-2)}$ ✓

$= \frac{3x^2 - 6x - 2x^2 + 6x}{(x-3)(x-2)}$ ✓

$= \frac{x^2}{(x-3)(x-2)}$ ✓

5

15. [5, 6 = 11 marks]

Simplify the following

a. $\dfrac{x^2+x-2}{x^2-1} \div \dfrac{x^2-x-6}{2x^2-18}$

$= \dfrac{(x+2)(x-1)}{(x-1)(x+1)} \times \dfrac{2(x-3)(x+3)}{(x+2)(x-3)}$ ✓✓✓✓

$= \dfrac{2(x+3)}{(x+1)}$ ✓

b. $\left(\dfrac{4u^2v^{-1}}{w^{-1}x^2}\right)^{-2} \times \left(\dfrac{6w^2x^{-1}}{u^{-1}v^3}\right)^2$

$= \dfrac{4^{-2}u^{-4}v^2 6^2 w^4 x^{-2}}{w^2 x^{-4} u^{-2} v^6}$ ✓✓

$= \dfrac{36u^{-2}v^{-4}w^2x^2}{16}$ ✓✓

$= \dfrac{9w^2x^2}{4u^2v^4}$ ✓✓

11

16. [2, 2, 2, 2 = 8 marks]

Given the two points (1, 2) and (3, 12)

a. Find the gradient of the line that passes through these 2 points.

$$m = \frac{12-2}{3-1} \quad \checkmark$$

$$= 5 \quad \checkmark$$

b. Find the equation of the line that passes through these 2 points.

$$y = mx + c$$

$$2 = 5 + c$$

$$c = -3$$

$$y = 5x - 3 \quad \checkmark\checkmark$$

c. Find the x- intercept of the line that passes through these 2 points.

$$0 = 5x - 3$$

$$x = \frac{3}{5} \quad \checkmark$$

$$\left(\frac{3}{5}, 0\right) \quad \checkmark$$

d. Find the midpoint between these two points.

$$\text{midpoint} = \left(\frac{1+3}{2}, \frac{2+12}{2}\right) \checkmark$$

$$= (2, 7) \quad \checkmark$$

8

17. [5 marks]

Given the line $y = 3x + 6$, determine the equation of the line that is perpendicular to the given line, and passes through the point (6, 5)

$m = -\frac{1}{3}$ ✓

$y = mx + c$

$5 = -\frac{1}{3} \times 6 + c$ ✓

$c = 7$ ✓

$y = -\frac{1}{3}x + 7$ ✓✓

5

18. [4, 6 = 10 marks]

At the fete, Joe bought 3 hotdogs and 5 cans of drink for \$15. Mary bought 4 hotdogs and 2 cans of drink for \$13. All drinks are the same price per can.

Let h represent the cost of hotdogs, and d represent the cost of drinks.

a. Write 2 equations, in terms of h and d, to represent each purchase.

$3h + 5d = 15$ — ① ✓✓

$4h + 2d = 13$ — ② ✓✓

b. Solve these simultaneous equations, using either the elimination method or substitution method, and hence find the cost of one hotdog and the cost of one drink.

① × 4 $12h + 20d = 60$ — ①′ ✓

② × 3 $12h + 6d = 39$ — ②′ ✓

①′ − ②′ $14d = 21$

$d = \frac{3}{2}$ ✓

$\Rightarrow h = \frac{15 - (5 \times 1.5)}{3}$ ✓

$= 2.5$ ✓

Cost of Drink is \$1.50 ✓

Cost of Hotdog is \$2.50

10