

## Solving Equations

$$1) 7n + 3 = 3n + 27$$

$$4n + 3 = 27$$

$$4n = 24$$

$$n = \frac{24}{4}$$

$$n = 6$$

$$2) 7n + 5 = 5n + 25$$

$$2n + 5 = 25$$

$$2n = 20$$

$$n = \frac{20}{2}$$

$$n = 10$$

$$3) 10n + 2 = 7n + 14$$

$$3n + 2 = 14$$

$$3n = 12$$

$$n = \frac{12}{3}$$

$$n = 4$$

$$4) 5n + 4 = 2n + 22$$

$$3n + 4 = 22$$

$$3n = 18$$

$$n = \frac{18}{3}$$

$$n = 6$$

$$5) 6n + 8 = 2n + 36$$

$$4n + 8 = 36$$

$$4n = 28$$

$$n = \frac{28}{4}$$

$$n = 7$$

$$6) 7n - 3 = 4n + 12$$

$$3n - 3 = 12$$

$$3n = 15$$

$$n = \frac{15}{3}$$

$$n = 5$$

$$7) 5n - 2 = n + 10$$

$$4n - 2 = 10$$

$$4n = 12$$

$$n = \frac{12}{4}$$

$$n = 3$$

$$8) 9n - 7 = 5n + 13$$

$$4n - 7 = 13$$

$$4n = 20$$

$$n = \frac{20}{4}$$

$$n = 5$$

$$9) 11n - 9 = 5n + 27$$

$$6n - 9 = 27$$

$$6n = 36$$

$$n = \frac{36}{6}$$

$$n = 6$$

$$10) 5n - 10 = 3n + 50$$

$$2n - 10 = 50$$

$$2n = 60$$

$$n = \frac{60}{2}$$

$$n = 30$$

$$11) 8n - 3 = 2n + 39$$

$$6n - 3 = 39$$

$$6n = 42$$

$$n = \frac{42}{6}$$

$$n = 7$$

$$12) 9n + 14 = 6n + 29$$

$$3n + 14 = 29$$

$$3n = 15$$

$$n = \frac{15}{3}$$

$$n = 5$$

$$13) 10n + 17 = 3n + 52$$

$$7n + 17 = 52$$

$$7n = 35$$

$$n = \frac{35}{7}$$

$$n = 5$$

$$14) 5n - 16 = n + 20$$

$$4n - 16 = 20$$

$$4n = 36$$

$$n = \frac{36}{4}$$

$$n = 9$$

$$15) 3n + 3 = 2n + 8$$

$$n + 3 = 8$$

$$n = 5$$

$$16) 6n + 5 = 4n + 18$$

$$2n + 5 = 18$$

$$2n = 13$$

$$n = \frac{13}{2}$$

$$17) 9n + 1 = 6n + 9$$

$$3n + 1 = 9$$

$$3n = 10$$

$$n = \frac{10}{3}$$

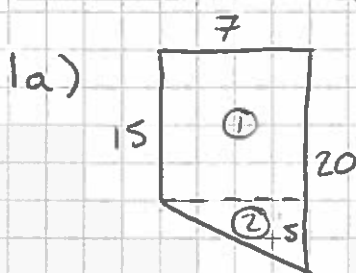
$$18) 5n - 5 = n + 10$$

$$4n - 5 = 10$$

$$4n = 15$$

$$n = \frac{15}{4}$$

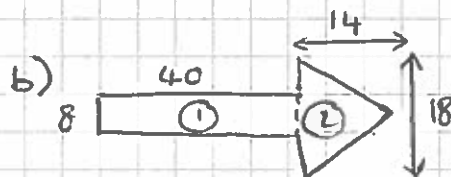
## Area of Composite Shapes



$$\textcircled{1} 7 \times 15 = 105$$

$$\textcircled{2} \frac{1}{2} \times 7 \times 5 = 17.5$$

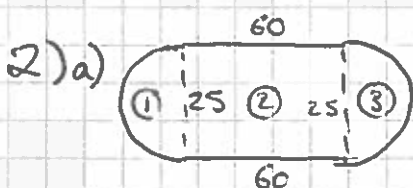
$$\underline{122.5 \text{ m}^2}$$



$$\textcircled{1} 8 \times 40 = 320$$

$$\textcircled{2} \frac{1}{2} \times 18 \times 14 = 126$$

$$\underline{446 \text{ mm}^2}$$



$$\textcircled{2} 25 \times 6 = 1500$$

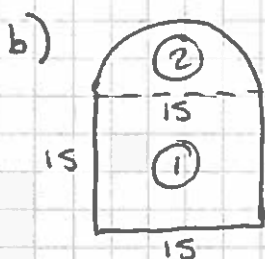
$$\textcircled{1+3} \pi r^2 = \pi \times 12.5^2 = 490.873\dots$$

① and ③ make a whole circle  
 $d = 25, r = 12.5$

Total Area

$$= 1500 + 490.873\dots$$

$$= 1990.87 \text{ m}^2 \quad (2 \text{ dp})$$



$$\textcircled{1} 15 \times 15 = 225$$

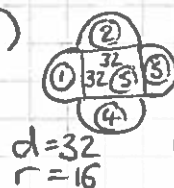
$$\textcircled{2} \frac{1}{2} \pi r^2 = \frac{1}{2} \times \pi \times 7.5^2 = 88.357$$

$$d = 15 \quad r = 7.5$$

$$\text{Total Area} = 225 + 88.357$$

$$= 313.36 \text{ m}^2 \quad (2 \text{ dp})$$

c) ① + ② + ③ + ④ is two whole circles



$$\textcircled{5} 32 \times 32 = 1024$$

$$d = 32$$

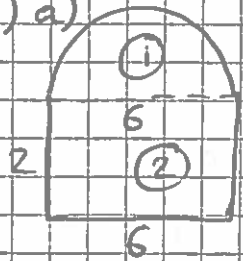
$$r = 16$$

$$\textcircled{1+2+3+4} 2 \times \pi r^2 = 2 \times \pi \times 16^2 = 1608.495\dots$$

$$\text{Total Area} = 1024 + 1608.495$$

$$= 2632.50 \text{ mm}^2 \quad (2 \text{ dp})$$

3) a)



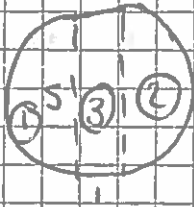
①  $\frac{1}{2} \times \pi \times 3^2 = 14.137...$

②  $6 \times 2 = 12$

Total Area =  $26.14 \text{ cm}^2$  (2dp)

$d=6$   $r=3$

b)



③  $1 \times 5 = 5$

①+②  $\pi r^2 = \pi \times 2.5^2 = 19.63$  (2dp)

Total A =  $5 + 19.63 = 24.63 \text{ cm}^2$  (2dp)

$d=5$   $r=2.5$

c)



$d=12$   
 $r=6$

①  $5 \times 6 = 30$

②  $\frac{1}{4} \pi r^2 = \frac{1}{4} \times \pi \times 6^2 = 28.27$  (2dp)

Total A =  $30 + 28.27 = 58.27 \text{ cm}^2$  (2dp)

## Linear Patterns

1) 

S	1	2	3	4	5	11
---	---	---	---	---	---	----

a) 

r	4	9	14	19	24	54
---	---	---	----	----	----	----

$(5n-1)$   
 $5 \times 11 - 1$   
 $= 55 - 1$   
 $= 54$

b)  $r = 5s - 1$

c)  $r = 79$

$79 = 5s - 1$

$80 = 5s$

$s = \frac{80}{5} = 16$  sections

2) 

b	2	3	4	8
---	---	---	---	---

a) 

c	5	7	9	17
---	---	---	---	----

$(2n+1)$   
 $2 \times 8 + 1$   
 $= 17$

c)  $c = 57$

$57 = 2b + 1$

$56 = 2b$

$b = \frac{56}{2} = 28$  bars

b)  $c = 2b + 1$

3)	p	2	3	4	5	6
a)	r	6	12	18	24	36

$(6n-6)$

b)  $r = 6p - 6$

c)  $r = 54$

$$54 = 6p - 6$$

$$60 = 6p$$

$$p = \frac{60}{6} = 10 \text{ posts}$$

### SPEED DISTANCE TIME

Distance  $D = S \times T$

1) a)  $S = 5 \text{ km/h}$   $T = 3 \text{ h } 20 \text{ min} = 3 \frac{20}{60} = 3.3333\dots$

$$D = S \times T$$

$$= 5 \times 3.3333\dots$$

$$= 16.666\dots = 16.67 \text{ km (2dp)}$$

b)  $S = 6 \text{ km/h}$   $T = 2 \text{ h } 10 \text{ min} = 2 \frac{10}{60} = 2.1666\dots$

$$D = S \times T$$

$$= 6 \times 2.1666\dots$$

$$= 13 \text{ km}$$

c)  $S = 12 \text{ km/h}$   $T = 6 \text{ hr } 45 \text{ min} = 6 \frac{45}{60} = 6.75$

$$D = S \times T$$

$$= 12 \times 6.75 = 81 \text{ km}$$

d)  $S = 50 \text{ km/h}$   $T = 8 \text{ hr } 40 \text{ min} = 8 \frac{40}{60} = 8.666\dots$

$$D = S \times T$$

$$= 50 \times 8.666\dots$$

$$= 433.333\dots = 433.33 \text{ km (2dp)}$$

2) a)  $S = 40 \text{ mph}$   $T = 1 \text{ hr } 30 = 1 \frac{30}{60} = 1.5$

$$D = S \times T$$

$$= 40 \times 1.5 = 60 \text{ miles}$$

$$b) S = 6 \text{ mph} \quad T = 1 \text{ hr } 24 = 1 \frac{24}{60} = 1.4$$

$$D = S \times T \\ = 6 \times 1.4 = 8.4 \text{ miles}$$

$$c) S = 80 \text{ mph} \quad T = 2 \text{ hr } 35 = 2 \frac{35}{60} = 2.58333\dots$$

$$D = S \times T \\ = 80 \times 2.58333\dots = 206.67 \text{ miles (2dp)}$$

$$d) S = 500 \text{ mph} \quad T = 4 \text{ hr } 32 = 4 \frac{32}{60} = 4.5333\dots$$

$$D = S \times T \\ = 500 \times 4.5333\dots = 2266.67 \text{ miles (2dp)}$$

Speed  $S = \frac{D}{T}$

$$1) a) D = 5 \text{ km} \quad T = 1 \text{ hr } 15 = 1 \frac{15}{60} = 1.25$$

$$S = \frac{D}{T} = \frac{5}{1.25} = 4 \text{ km/h}$$

$$b) D = 1000 \text{ miles} \quad T = 2 \text{ hr } 40 = 2 \frac{40}{60} = 2.666\dots$$

$$S = \frac{D}{T} = \frac{1000}{2.666\dots} = 375 \text{ mph}$$

$$c) D = 90 \text{ km} \quad T = 1 \text{ hr } 25 \text{ min} = 1 \frac{25}{60} = 1.41666\dots$$

$$S = \frac{D}{T} = \frac{90}{1.41666\dots} = 63.53 \text{ km/h (2dp)}$$

$$2) a) D = 2000 \text{ miles} \quad T = 4 \text{ hr } 10 \text{ min} = 4 \frac{10}{60} = 4.1666\dots$$

$$S = \frac{D}{T} = \frac{2000}{4.1666\dots} = 480 \text{ mph}$$

Time  $T = \frac{D}{S}$

$$1) a) D = 30 \text{ km} \quad S = 15 \text{ km/h}$$

$$T = \frac{D}{S} = \frac{30}{15} = 2 \text{ hrs}$$

$$b) D = 40 \text{ km} \quad S = 20 \text{ km/h}$$

$$T = \frac{D}{S} = \frac{40}{20} = 2 \text{ hrs}$$

c)  $D = 20\text{km}$   $S = 10\text{km/h}$

$$T = \frac{D}{S} = \frac{20}{10} = 2 \text{ hrs}$$

d)  $D = 20\text{km}$   $S = 12\text{km/h}$

$$T = \frac{D}{S} = \frac{20}{12} = 1.666\dots = 1 \text{ hr } 40 \text{ mins}$$

$\underbrace{\hspace{10em}}_{0.666\dots \times 60}$

2) a)  $D = 18\text{km}$   $S = 6\text{km/h}$

$$T = \frac{D}{S} = \frac{18}{6} = 3 \text{ hrs}$$

b)  $D = 120\text{miles}$   $S = 70\text{mph}$

$$T = \frac{D}{S} = \frac{120}{70} = 1.71428\dots = 1 \text{ hr } 43 \text{ mins}$$

$\underbrace{\hspace{10em}}_{0.71428\dots \times 60}$

c)  $D = 340\text{km}$   $S = 15\text{km/h}$

$$T = \frac{D}{S} = \frac{340}{15} = 22.6666 = 22 \text{ hrs } 40 \text{ mins}$$

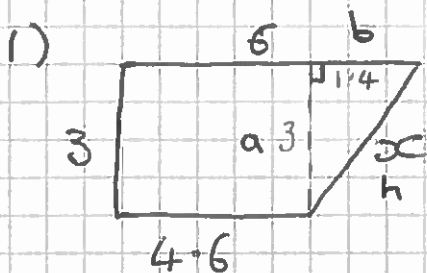
$\underbrace{\hspace{10em}}_{0.666\dots \times 60}$

d)  $D = 3400\text{miles}$   $S = 500\text{mph}$

$$T = \frac{D}{S} = \frac{3400}{500} = 6.8 = 6 \text{ hrs } 48 \text{ mins}$$

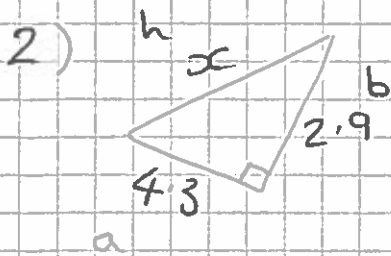
$\underbrace{\hspace{10em}}_{0.8 \times 60}$

## Pythagoras



$$\begin{aligned} h^2 &= a^2 + b^2 \\ x^2 &= 3^2 + 1.4^2 \\ x^2 &= 10.96 \\ x &= \sqrt{10.96} \\ &= 3.31 \text{ m} \\ &\quad (2 \text{ dp}) \end{aligned}$$

$$\begin{aligned} P &= 6 + 3 + 4.6 + 3.31 \\ &= 16.91 \text{ m} \\ &\quad (2 \text{ dp}) \end{aligned}$$



$$h^2 = a^2 + b^2$$

$$h^2 = 4.3^2 + 2.9^2$$

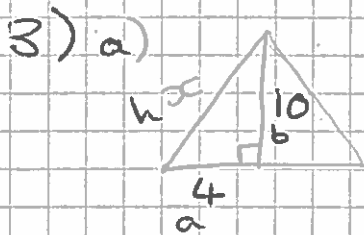
$$h^2 = 26.9$$

$$h = \sqrt{26.9}$$

$$= 5.19 \text{ m} \quad (2 \text{ dp})$$

$$P = 5.19 \times 4$$

$$= 20.76 \text{ m} \quad (2 \text{ dp})$$



$$h^2 = a^2 + b^2$$

$$x^2 = 4^2 + 10^2$$

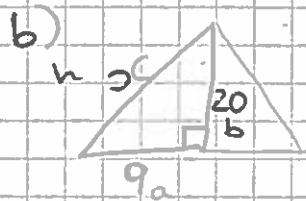
$$x^2 = 116$$

$$x = \sqrt{116}$$

$$x = 10.77 \text{ cm}$$

$$P = 10.77 + 10.77 + 8$$

$$= 29.54 \text{ cm} \quad (2 \text{ dp})$$



$$h^2 = a^2 + b^2$$

$$x^2 = 9^2 + 20^2$$

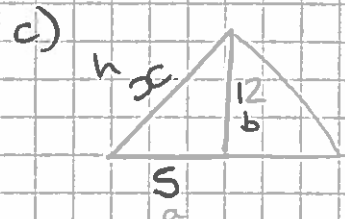
$$x^2 = 481$$

$$x = \sqrt{481}$$

$$x = 21.93 \text{ cm}$$

$$P = 21.93 + 21.93 + 18$$

$$= 61.86 \text{ cm} \quad (2 \text{ dp})$$



$$h^2 = a^2 + b^2$$

$$x^2 = 5^2 + 12^2$$

$$x^2 = 169$$

$$x = \sqrt{169}$$

$$x = 13 \text{ cm}$$

$$P = 13 + 13 + 10$$

$$= 36 \text{ cm}$$

## Probability

1) 10 choc Smint  
A

$$P(\text{choc A}) = \frac{10}{15} = \frac{2}{3}$$

$$= 0.666\dots$$

7 choc 2 strawb  
B

$$P(\text{choc B}) = \frac{7}{9}$$

$$= 0.777\dots$$

$$0.777 > 0.666$$

∴ She should take a chocolate from bag B as the probability of getting what she wants is greater.

$$2) \quad P(\text{win prize A}) = \frac{5}{80} = \frac{1}{16} \quad P(\text{win prize B}) = \frac{8}{120} = \frac{1}{15}$$

$$= 0.0625$$

$$= 0.0666$$

$$0.0625 < 0.0666$$

∴ Corinne has a better chance of winning prize B

$$3) \quad P(\text{picked from A}) = \frac{8}{30} = \frac{4}{15} \quad P(\text{picked from B}) = \frac{6}{24} = \frac{1}{4}$$

$$= 0.2666$$

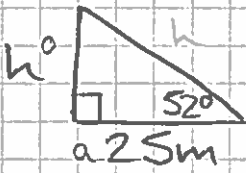
$$= 0.25$$

$$0.266 > 0.25$$

∴ The representative is more likely to come from class A.



# Trigonometry

1)  SOH CAH TOA

$$\tan 52^\circ = \frac{h}{25}$$

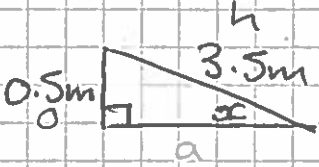
$$\tan 52^\circ = \frac{h}{25}$$

$$25 \times \tan 52 = h$$

$$h = 31.998 \dots$$

$$= 32.00 \text{ m (2dp)}$$

$32 > 30 \text{ m}$   $\therefore$  Steven is not correct

2)  SOH CAH TOA

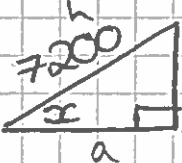
$$\sin x^\circ = \frac{0.5}{3.5}$$

$$\sin x^\circ = \frac{0.5}{3.5}$$

$$x^\circ = \sin^{-1}\left(\frac{0.5}{3.5}\right)$$

$$= 8.213^\circ \text{ (3dp)}$$

$8.213 > 8^\circ$   $\therefore$  the ramp is not safe.

3)  SOH CAH TOA

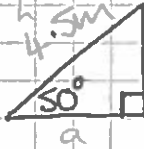
$$\sin x^\circ = \frac{7200}{830}$$

$$\sin x^\circ = \frac{830}{7200}$$

$$x^\circ = \sin^{-1}\left(\frac{830}{7200}\right)$$

$$= 6.62^\circ \text{ (2dp)}$$

$5^\circ < 6.62^\circ < 7^\circ$   $\therefore$  the ramp will be suitable.

4)  SOH CAH TOA

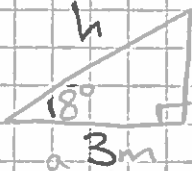
$$\sin 50^\circ = \frac{4.5}{x}$$

$$\sin 50^\circ = \frac{x}{4.5}$$

$$4.5 \times \sin 50 = x$$

$$x = 3.45 \text{ m (2dp)}$$

$3.45 < 3.5 \text{ m}$   $\therefore$  Annie can let her child play on the slide.

5)  SOH CAH TOA

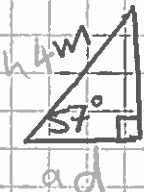
$$\tan 18^\circ = \frac{h}{3}$$

$$\tan 18 = \frac{h}{3}$$

$$3 \times \tan 18 = h$$

$$h = 0.97 \text{ m (2dp)}$$

$0.97 < 1 \text{ m}$   $\therefore$  the driveway would pass

6)  SOH CAH TOA

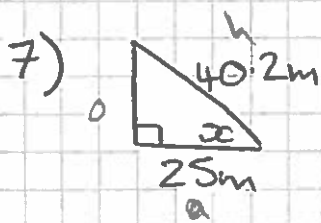
$$\cos 57^\circ = \frac{d}{4}$$

$$\cos 57^\circ = \frac{d}{4}$$

$$4 \times \cos 57 = d$$

$$d = 2.18 \text{ m (2dp)}$$

$2.18 < 2.2 \text{ m}$   $\therefore$  the ladder is a safe distance from the wall.



SOH CAH TOA

$$\cos x^\circ = \frac{a}{h}$$

$$\cos x^\circ = \frac{25}{40.2}$$

$$x = \cos^{-1}\left(\frac{25}{40.2}\right)$$

$$x = 51.55^\circ$$

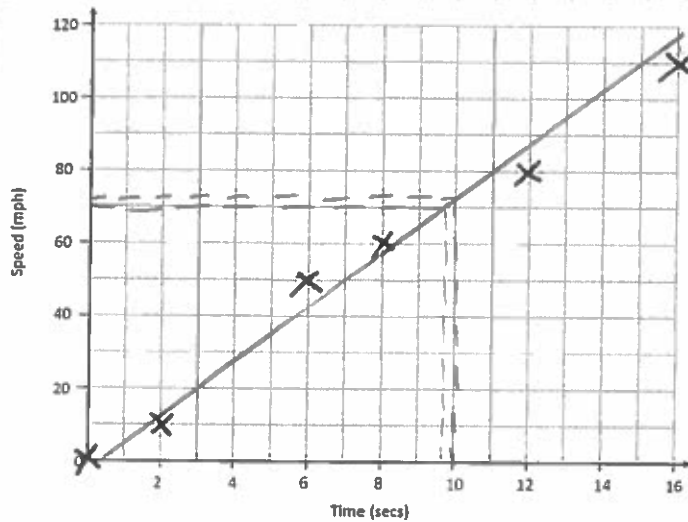
(2dp)

$$51.55 > 50^\circ$$

∴ He should be able to safely jump across

## Scattergraphs

1)

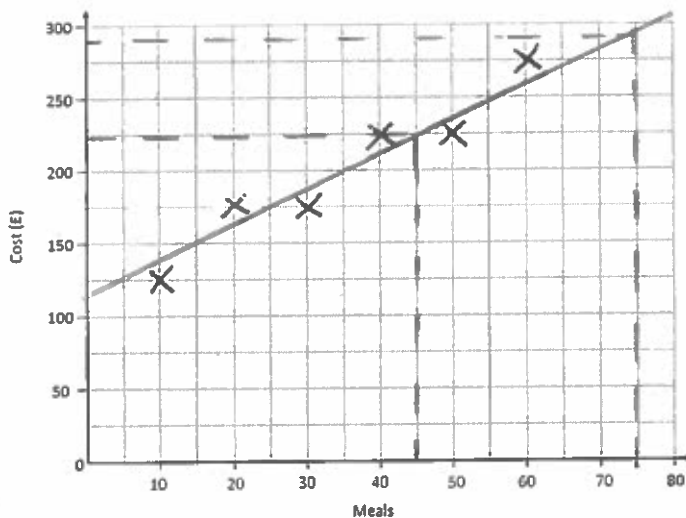


Time = 10s  
Speed = 72 mph

Speed = 70 mph  
Time = 9.7s

∴ it is a reasonable estimate to say that a speed of 70 mph has approximately 10s of acceleration.

2)



meals = 45  
Cost = £225

meals = 75  
Cost = £285

∴ The £300 estimate is £15 away from the predicted cost. However, it is a pretty good estimate.