

Mean from a grouped table

Foot length	Frequency	Midpoint	Freq. x Mid.
$5 < L \leq 10$	5	7.5	37.5
$10 < L \leq 15$	17	12.5	212.5
$15 < L \leq 20$	8	17.5	140
	30		390

a) Median foot length: $\frac{30+1}{2} = "15.5\text{th foot}"$

5 between 5 and 10 (not got to 15.5th yet)
22 between 5 and 15 [$5+17=22$] (gone past 15.5th)

median class $10 < L \leq 15$

b) Mean: $\frac{390}{30} = 13\text{cm}$

Simultaneous Equations

$$\begin{array}{rcl} \text{a)} & 3x + 4y = 26 & \times 3 \rightarrow 9x + 12y = 78 \\ & 8x - 3y = 3 & \times 4 \rightarrow +32x - 12y = 12 \\ & & \hline & 41x & = 90 \\ & & x = \frac{90}{41} \end{array}$$

$$12y \square - 12y = 0$$

↑
must be '+'

$$\begin{array}{rcl} \text{b)} & 5x - 2y = 36 & \times 3 \rightarrow 15x - 6y = 108 \\ & 3x - 5y = 33 & \times 5 \rightarrow 15x - 25y = 165 \\ & & \hline & & 19y = -57 \\ & & y = -3 \end{array}$$

$$15x \square 15x = 0$$

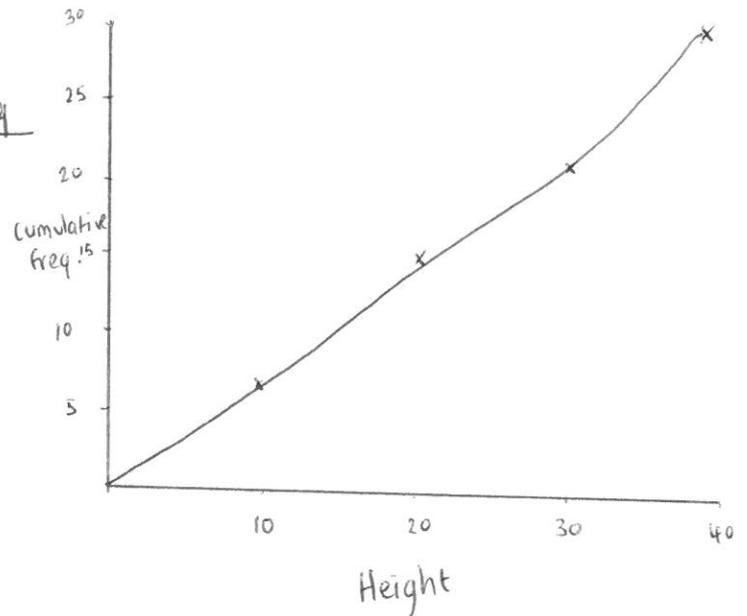
↑
must be '-'

$$\begin{aligned} 5x - 2(-3) &= 36 \\ 5x + 6 &= 36 \\ 5x &= 30 \\ x &= 6 \end{aligned}$$

check: $3(6) - 5(-3)$
 $18 - -15 = 33 \checkmark$

Cumulative Frequency

Height	Freq	Cumulative Freq
$0 < h \leq 10$	7	7
$10 < h \leq 20$	8	$7+8 = 15$
$20 < h \leq 30$	6	$7+8+6 = 21$
$30 < h \leq 40$	9	$7+8+6+9 = 30$



Change the subject (to x)

a) $bx + t = p$

$$\begin{array}{l} -t \\ \div b \end{array} \left| \begin{array}{l} bx + t = p \\ bx = p - t \\ x = \frac{p-t}{b} \end{array} \right. \begin{array}{l} -t \\ \div b \end{array}$$

b) $\frac{x}{p} - s = q$

$$\begin{array}{l} +s \\ \times p \end{array} \left| \begin{array}{l} \frac{x}{p} - s = q \\ \frac{x}{p} = q + s \\ x = p(q+s) \end{array} \right. \begin{array}{l} +s \\ \times p \end{array}$$

[or $pq + ps$]

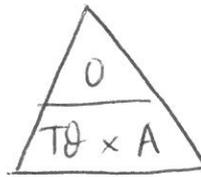
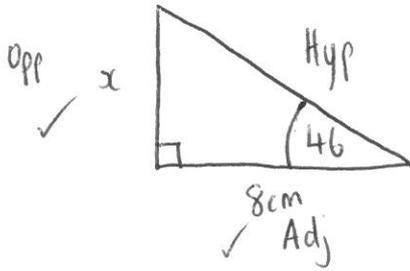
c) $t(x-m) = y+m$

$$\begin{array}{l} \div t \\ +m \end{array} \left| \begin{array}{l} t(x-m) = y+m \\ x-m = \frac{y+m}{t} \\ x = \frac{y+m}{t} - m \end{array} \right. \begin{array}{l} \div t \\ +m \end{array}$$

OR

$$\begin{array}{l} +tm \\ \div t \end{array} \left| \begin{array}{l} tx - tm = y+m \\ tx = y+m+tm \\ x = \frac{y+m+tm}{t} \end{array} \right. \begin{array}{l} +tm \\ \div t \end{array}$$

Trigonometry



$$\begin{aligned} \text{opp} &= \tan \theta \times \text{adj} \\ &= \tan(46) \times 8 \\ &= 8 \cdot 28 \text{ cm (2dp)} \end{aligned}$$

Box Plots

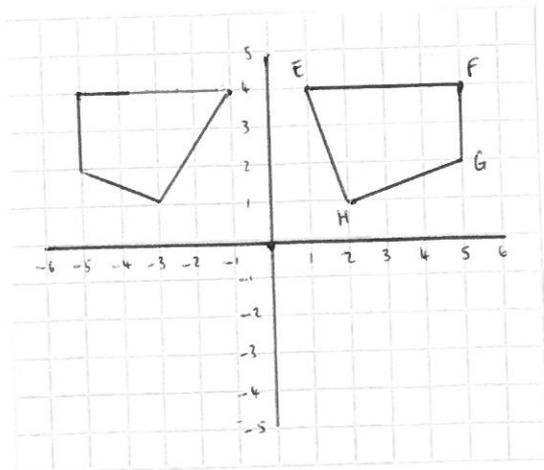
The median of class 1 is higher which means on average they scored higher than class 2

The range (or interquartile range) are smaller for class 1

Transformations

a) Translation by the vector $\begin{pmatrix} -3 \\ -6 \end{pmatrix}$

b)



Factorise Quadratics

a) $x^2 - 5x + 6$

numbers that \times to make 6:

3	2	
-3	-2	← add to make -5
6	1	
-6	-1	

$$(x-3)(x-2)$$

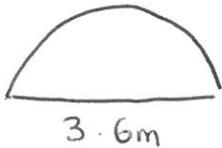
b) $x^2 - 9$

numbers that \times to make -9:

9	-1	
-9	1	
-3	3	← add to make 0

$$(x-3)(x+3)$$

Semi-circles



circumference of full circle: $\pi \times d$

$$\pi \times 3.6$$

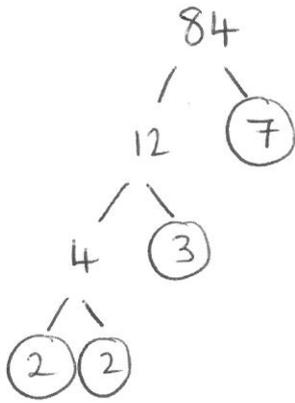
$$= 11.31 \text{ cm (2dp)}$$

$$\text{semi-circle: } 11.31 \div 2 = 5.65 \text{ cm}$$

$$\text{perimeter: } 5.65 + 3.6 = 9.25 \text{ cm}$$

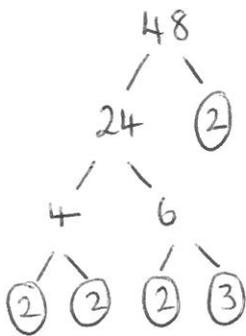
HCF and LCM

a)

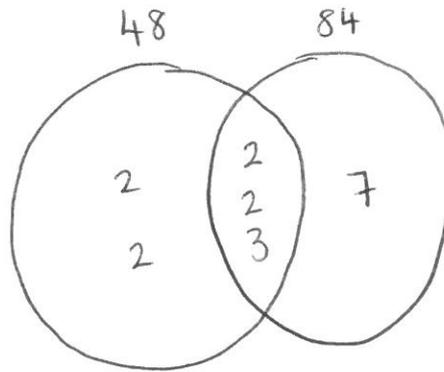


$$2 \times 2 \times 3 \times 7 \quad [\text{or } 2^2 \times 3 \times 7]$$

b)



$$2 \times 2 \times 2 \times 2 \times 3$$



$$\text{HCF} = 2 \times 2 \times 3 = 12$$

$$\text{LCM} = 12 \times 2 \times 2 \times 7 = 336$$

Ratio

Red : Blue

3 : 4

28 : ?

$$\frac{28}{3} = 1 \text{ lot}$$

$$\text{So } 4 \text{ lots} = 4 \times 9\frac{1}{3} = 37\frac{1}{3} \text{ litres}$$

$$9\frac{1}{3} \text{ litre} = 1 \text{ lot}$$

Form and solve equations

Angles in a quadrilateral add up to 360°

$$\textcircled{x} - 10 + \textcircled{x} + 20 + 90 + \textcircled{2x} - 60 = 360$$

$$4x + 40 = 360$$

$$4x = 320$$

$$x = 80$$

Scatter Graphs

a) Positive correlation

Compound Interest

a) Decrease by 12% = 88% left
88% = 0.88 as a decimal

$$2\text{m} = 200\text{ cm}$$

$$\text{Bounce 1} = 200\text{ cm}$$

$$\text{Bounce 2} = 200 \times 0.88 = 176\text{ cm}$$

$$\text{Bounce 3} = 200 \times 0.88 \times 0.88 = 154.88\text{ cm}$$

(or 200×0.88^2)

b) Bounce 8 = $200 \times 0.88^7 = 81.74\text{ cm}$ (2dp)

c) Bounce 10 = $200 \times 0.88^9 = 63.30\text{ cm}$ (2dp)

Standard Form

a) $1.2 \times 10^3 = 1200$

$2.1 \times 10^{-2} = 0.021$

$1.02 \times 10^{-3} = 0.00102$

$1.02 \times 10^{-3}, 2.1 \times 10^{-2}, 1.2 \times 10^3, 2100$

b) $(3.2 \times 10^3) \times (2.4 \times 10^5)$

$\underbrace{3.2 \times 2.4} \times \underbrace{10^3 \times 10^5}_{10^8}$

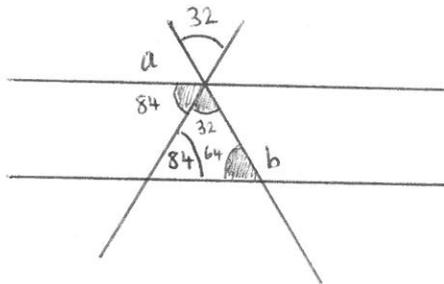
$32 \times 24 = 768$

x	20	4
30	600	120
2	40	8

so $3.2 \times 2.4 = 7.68$

7.68×10^8

Angles on parallel lines



$a = 180 - 84 - 32 = 64^\circ$ because

- alternate angles are equal (84°)
- vertically opposite angles are equal (32°)
- angles on a straight line add up to 180°

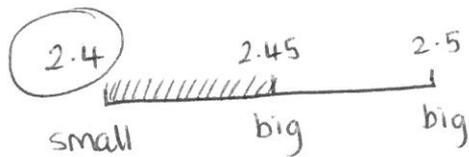
$b = 180 - 84 - 32 = 64^\circ$ because

- vertically opposite angles are equal (32°)
- angles in a triangle add up to 180°

Trial & Improvement

$$x^3 + 4x = 24$$

x	x^3	$4x$	Answer	Comment
2	8	8	16	too small
3	27	12	39	too big
2.5	15.625	10	25.625	too big
2.4	13.824	9.6	23.424	too small
2.45	14.706125	9.8	24.506125	too big



$$x = 2.4 \text{ (to 1 dp)}$$