

# AGS Maths Stars



Identify from the following list of numbers

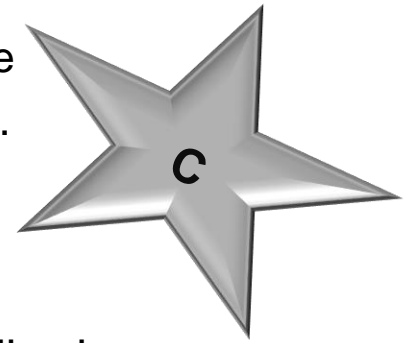
- 33, 29, 24, 125, 81, 9
- a) Square number: **81**
  - b) Cube Number: **125**
  - c) Multiple of 6: **24**
  - d) Prime number: **29**

Mr Laidler believes  $\frac{5}{6}$  of £240 is the same as increasing £140 by 40% is he correct.  
(explain your answer)

$$240 \div 6 = 40 \quad 40 \times 5 = \text{£}200$$

$$140 \times 1.4 = \text{£}196$$

Mr Laidler is incorrect as there is a £4 difference.



Evaluate the following

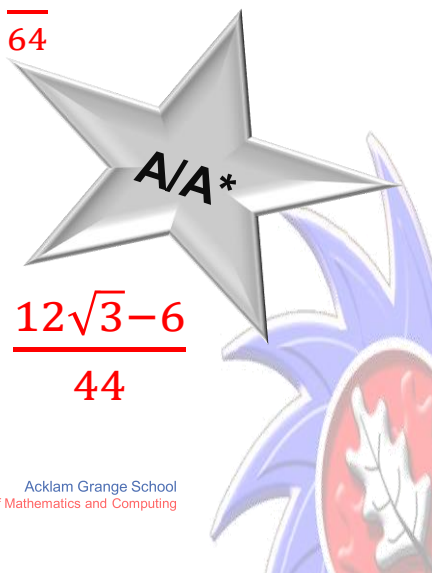
- a)  $(8^3)^2 = 8^6$
- b)  $8^0 = 1$
- c)  $8^{-1} = \frac{1}{8}$
- d)  $8^{-2} = \frac{1}{8^2} = \frac{1}{64}$



Rationalise the denominators

$$a) \frac{3}{\sqrt{5}} = \frac{3}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{3\sqrt{5}}{5}$$

$$b) \frac{3}{4\sqrt{3}+2} = \frac{3}{4\sqrt{3}+2} \times \frac{4\sqrt{3}-2}{4\sqrt{3}-2} = \frac{12\sqrt{3}-6}{16 \times 3 - 4} = \frac{12\sqrt{3}-6}{44}$$



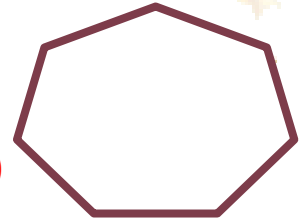
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Write a formula for the perimeter of the regular polygon.

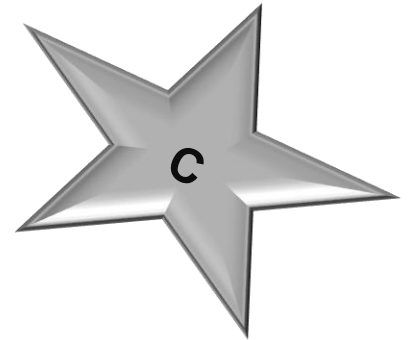
$$7a + 14 \text{ (1mark)}$$

$$p = 7a + 14 \text{ (2 marks)}$$



Complete the table for drawing a pie chart. 600 seats were predicted in a poll.

Prediction Polls	Frequency	Degrees
Conservative	316	189.6
Labour	228	136.8
SNP	56	33.6



Expand the following expressions.

$$a) 3x(x^2 - 2y) = 3x^3 - 6xy$$

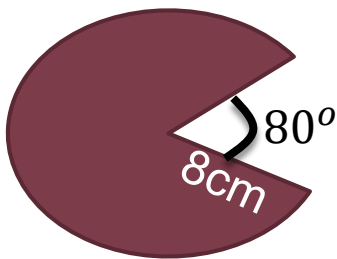
$$b) (x + 5)(x - 6) = x^2 - x - 30$$

Factorise the following expressions.

$$a) 8x^2 - 24xy = 8x(x - 3y)$$

$$b) x^2 + 5x + 6 = (x + 3)(x + 2)$$

The shaded area is equal to  $160\text{cm}^2$ . True or False?



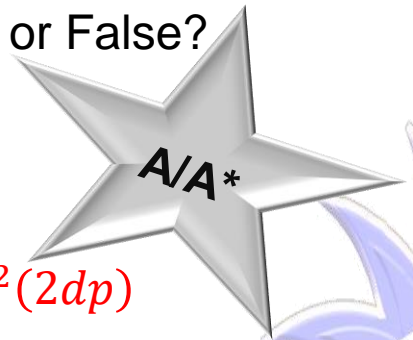
*Angle of sector*

$$360^\circ - 80^\circ = 280^\circ$$

*Area of sector*

$$\frac{280}{360} \times \pi \times 8^2 = 156.38\text{cm}^2 \text{ (2dp)}$$

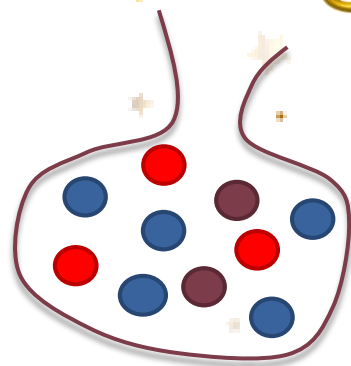
So the answer is false because it is  $3.62\text{cm}^2$  smaller.



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Calculate the probability of selecting

- a) Blue  $\frac{5}{10} = \frac{1}{2}$
- b) Purple  $\frac{2}{10} = \frac{1}{5}$
- c) Yellow 0
- d) Not Red  $\frac{7}{10}$

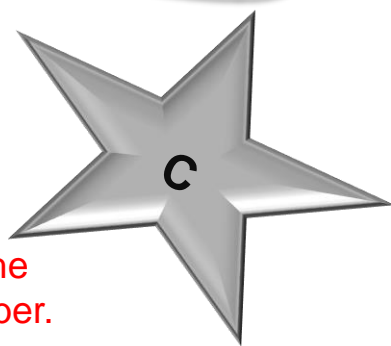


Calculate the mean from the table.

Goals	Frequency	fx
0	11	0
1	16	16
2	8	16
3	5	15
Total	40	47

$$\begin{aligned} \text{Mean} &= \frac{\sum fx}{\sum f} \\ &= \frac{47}{40} \\ &= 1.175 \end{aligned}$$

1 goal rounded to the nearest whole number.

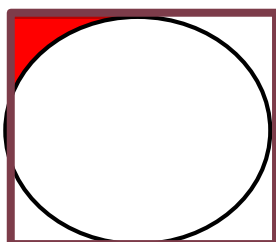


Calculate the area of the shaded section, leave you answer in terms of pi.

Area Square:  $8 \times 8 = 64\text{cm}^2$

Area Circle:  $\pi \times 8 \times 8 = 64\pi\text{cm}^2$

Area Shaded:  $\frac{64 - 64\pi}{4} = 16 - 16\pi\text{cm}^2$



8cm

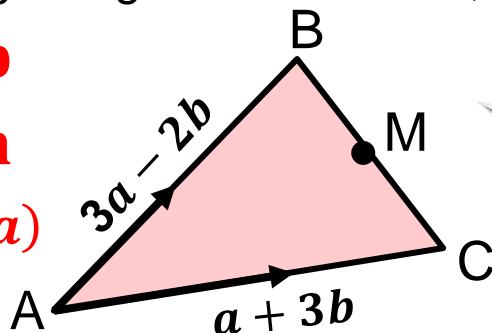


Describe the following using vector notation, M is the midpoint.

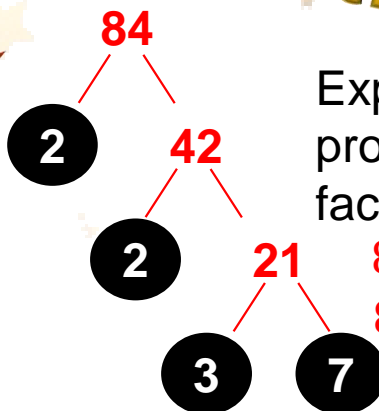
a)  $\vec{CB} = 2a - 5b$

b)  $\vec{BC} = 5b - 2a$

c)  $\vec{BM} = \frac{1}{2}(5b - 2a)$



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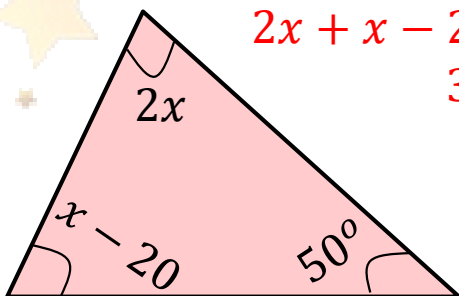


Express 84 as a product of prime factors.

$$84 = 2 \times 2 \times 3 \times 7$$

$$84 = 2^2 \times 3 \times 7$$

Calculate the value of  $x$ .

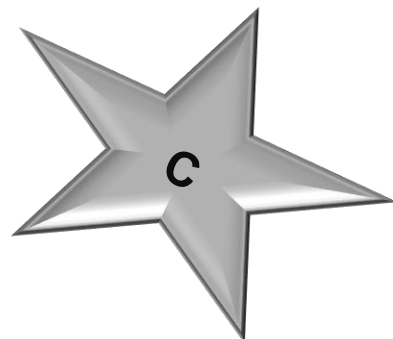


$$2x + x - 20 + 50 = 180$$

$$3x + 30 = 180$$

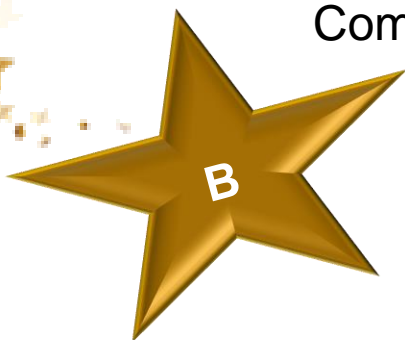
$$3x = 150$$

$$x = 50^\circ$$



Complete the table for drawing a histogram

Weight (g)	Frequency	Fd
$0 \leq w < 10$	18	1.8
$10 \leq w < 15$	12	2.4
$15 \leq w < 25$	6	0.6
$25 \leq w < 40$	45	3



Simplify fully  $\frac{n^2 - 81}{n^2 - 12n + 27}$

$$= \frac{(n + 9)(n - 9)}{(n - 3)(n - 9)}$$

$$= \frac{n + 9}{n - 3}$$

$$= \frac{n + 9}{n - 3}$$



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a) Express  $\frac{15}{4} = 3\frac{3}{4}$ .

b)  $\frac{2}{5} \times \frac{3}{4} = \frac{6}{20} = \frac{3}{10}$

c)  $\frac{5}{6} - \frac{2}{3} = \frac{5}{6} - \frac{4}{6} = \frac{1}{6}$

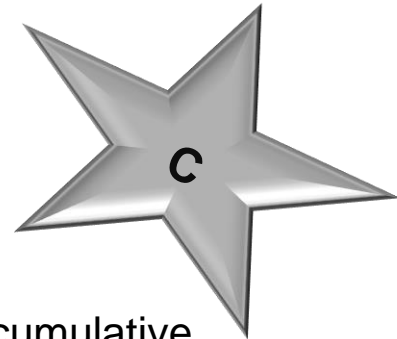
Solve the following equations.

a)  $3x - 7 = 29$

$3x = 36$

$x = 12$

b)  $\frac{x}{4} + 12 = 18$       $\frac{x}{4} = 6$       $x = 24$

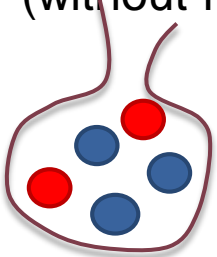


Complete the table for a cumulative frequency graph

Height (m)	Frequency	CF
$110 < h \leq 120$	28	28
$120 < h \leq 130$	13	41
$130 < h \leq 140$	19	60
$140 < h \leq 150$	22	82

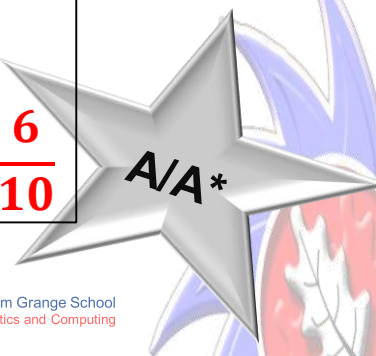


What is the probability of me selecting both a blue and a red ball (without replacement).



$$\begin{array}{l}
 \text{red} \quad \frac{2}{5} \\
 \text{blue} \quad \frac{3}{5} \\
 \text{red} \quad \frac{2}{4} \\
 \text{blue} \quad \frac{3}{4} \\
 \text{red} \quad \frac{2}{4} \\
 \text{blue} \quad \frac{3}{5}
 \end{array}
 \begin{array}{l}
 \text{red} \\
 \text{blue} \\
 \text{red} \\
 \text{blue}
 \end{array}
 \begin{array}{l}
 \frac{1}{4} \\
 \frac{2}{5} \\
 \frac{3}{4} \\
 \frac{2}{5} \\
 \frac{3}{4} \\
 \frac{2}{5}
 \end{array}
 \begin{array}{l}
 = \frac{2}{20} \\
 = \frac{6}{20} \\
 = \frac{6}{20} \\
 = \frac{6}{20} \\
 = \frac{6}{20} \\
 = \frac{6}{20}
 \end{array}$$

$$\begin{array}{l}
 \frac{6}{20} + \frac{6}{20} \\
 = \frac{12}{20} = \frac{6}{10}
 \end{array}$$



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8, 7, 3, 5, 9, 7

3, 5, 7, 7, 8, 9

From the list above find the

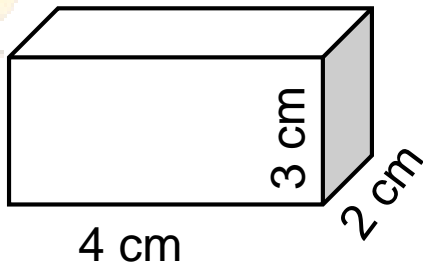
a) Mode = **7**

b) Median = **7**

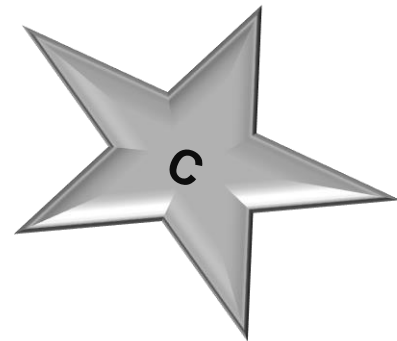
c) Range =  **$9 - 3 = 6$**

d) Mean =  $\frac{3+5+7+7+8+9}{6} = \frac{39}{6} = 6.5$

Calculate the volume of this shape.



$$\begin{aligned} 4 \times 2 \times 3 \\ = 8 \times 3 \\ = 24\text{cm}^3 \end{aligned}$$



A coat cost £106.25 in a 15% sale. How much did it originally cost?

85%: 106.25

100%:  $106.25 \div 0.85 = \text{£}125$

Solve this pair of simultaneous equations.

$3x + 2y = 22$  (1)

$5x - 3y = 5$  (2)

$9x + 6y = 66$  (3)=(1)x3

$10x - 6y = 10$  (4)=(2)x2

$19x = 76$  (3)+(4)

$x = 4$

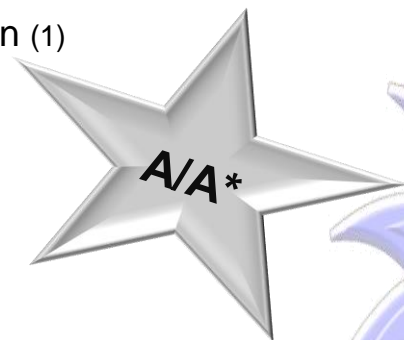
$3x + 2y = 22$  sub  $x$  in (1)

$3 \times 4 + 2y = 22$

$12 + 2y = 22$

$2y = 10$

$y = 5$



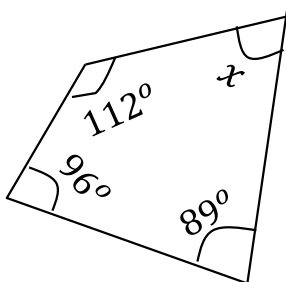
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Calculate

$$\begin{aligned} \text{a) } 4 + (4 - 6) \times 7 \\ &= 4 + 2 \times 7 \\ &= 4 + 14 \\ &= \mathbf{18} \end{aligned}$$

$$\begin{aligned} \text{b) } 9 - 4 \times 7 \\ &= 9 - 28 \\ &= \mathbf{19} \end{aligned}$$

Calculate the size of the missing angle.



$$112 + 96 + 89 = 297^\circ$$

$$360^\circ - 297^\circ = 63^\circ$$

$$x = 63^\circ$$

Calculate the mean from the table.

Height (cm)	Frequency	MP	Fx
$110 < h \leq 120$	9	115	1035
$120 < h \leq 130$	12	125	1500
$130 < h \leq 140$	15	135	2025
$140 < h \leq 150$	14	145	2030
	50		6590

$$\begin{aligned} \text{Mean} &= \frac{\sum fx}{\sum f} \\ &= \frac{6590}{50} \\ &= \mathbf{131.8cm} \end{aligned}$$

Mrs Gardner invests £240 in a bank at an interest rate of 0.5% How much will she have after 7 years?.

$$\begin{aligned} &240 \times (1.005)^7 \\ &= \mathbf{£248.53 \text{ (2dp)}} \end{aligned}$$