

- 1 (a) Jo has the following nine coins in her purse.

~~10p~~ ~~1p~~ ~~2p~~ 50p ~~10p~~ ~~1p~~ 20p ~~2p~~ ~~1p~~

- (i) Work out the median.

$$\frac{n+1}{2}$$

$$= \frac{9+1}{2} = 5^{\text{th}}$$

1 1 1 2 2 10 10 20 50

(a)(i) 2 p [2]

- (ii) Write down the range.

50 - 1

(ii) 49 p [1]

- (b) Twenty people emptied their pockets and counted the number of coins they had. The frequency table shows the data.

x Number of coins	(F) Frequency	Fx
5	3	15
7	6	42
8	5	40
10	4	40
15	2	30
		167

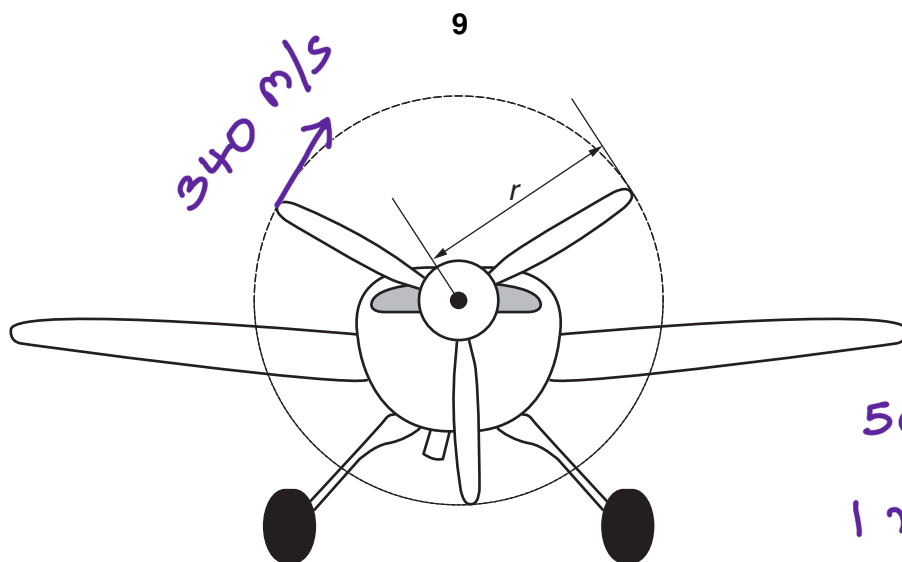
Work out the mean.

$$\Sigma F = 20$$

$$\hookrightarrow 8.35$$

(b) _____ [3]

(c)



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

$$50 \text{ rev} \rightarrow 1 \text{ sec}$$

$$1 \text{ rev} \rightarrow \frac{1}{50} \text{ sec}$$

The propeller on a Red Bull racer turns 50 times each second.
The tip of the propeller is travelling at 340 m/s, the speed of sound.

Calculate the radius, r , of the propeller.

$$D = S \times T = 340 \times 0.02$$

$$\text{Circumference} = 6.8 \text{ m}$$

$$\frac{2\pi r}{2\pi} = \frac{6.8}{2\pi}$$

$$r = 1.08 \text{ m}$$

(c) _____ m [5]

- 4 (a) Here is a sequence of multiples of 3.

3 6 9 12 15 _____

Write down the next two numbers in the sequence.

[1]

ALL the sequences in the rest of this question start with a positive whole number and use this rule to work out the numbers.

Look at the last number recorded:

- if it is a multiple of 3, divide it by 3;
- if it is not a multiple of 3, add 2.

- (b) One sequence starts as follows.

17 19 21 7 9 3 1 3

17 is not a multiple of 3 so we add 2, getting 19.

21 is a multiple of 3 so we divide by 3, getting 7.

- (i) Write down the next four numbers in the sequence.

[2]

- (ii) Write down the 100th number in the sequence. Explain how you decided.

_____ because _____

_____ [2]

- (c) Another sequence starts with 10 and uses the same rule as before.

Find the 100th number in this sequence.

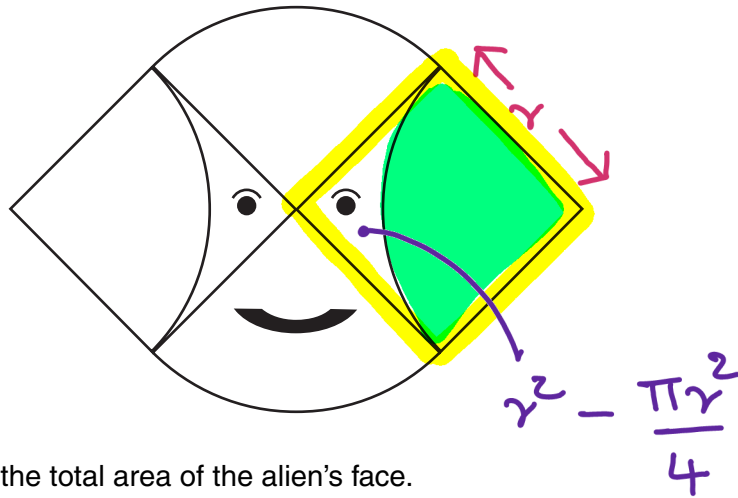
10 12 4 6 2 4 6 2 4 6

2 4 6 2 4 6 2 4 6 2

4 6 2 4 6 2 ^(c) 4 6 2 4 [3]

- (c) Sam cut a circle, of radius r cm, into quarters. She arranged the quarter circles and glued them onto paper to make this face of an alien.

$$4 \times \frac{\pi r^2}{4} = \pi r^2$$



Find, in terms of r , the total area of the alien's face.

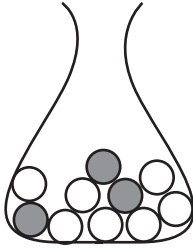
$$\begin{aligned} & \frac{r^2(4-\pi)}{2} + \frac{\pi r^2}{1} \times \frac{2}{2} \\ &= \frac{r^2(4-\pi) + 2\pi r^2}{2} \\ &= \frac{r^2(4-\pi+2\pi)}{2} \end{aligned}$$

$$\begin{aligned} &= \frac{4r^2 - \pi r^2}{4} \times 2 \\ &= \frac{1}{2} (4r^2 - \pi r^2) \\ &= \frac{r^2(4-\pi)}{2} \end{aligned}$$

(c) _____ cm² [5]

$$= \frac{r^2(\pi+4)}{2}$$

- 6 (a) Peter has a bag of 10 marbles.
There are 3 green marbles in the bag.



Peter chooses a marble at random from the bag.

Write down the probability that Peter chooses a green marble.

(a) $\frac{3}{10}$ [1]

- (b) Sally has a bag of marbles.
Some of the marbles are orange; the rest are purple.

The probability of choosing an orange marble at random from the bag is $\frac{1}{5}$.

Sally doubles the number of orange marbles in the bag, without changing the number of purple marbles.

Work out the new probability of choosing an orange marble at random from the bag.

	O	:	P	total	
	x	:	4x	5x	$P(O) = \frac{1}{5}$ ← O
x2 ↓	2x	:	4x	6x	← total
	2x	:	4x	6x	
	$P(O) = \frac{2x}{6x} = \frac{1}{3}$				(b) _____ [3]

- (c) Reuben has a bag of marbles.
 The marbles are red, yellow or blue.
 There are 8 blue marbles in the bag, x red marbles and y yellow marbles.
 The probability of choosing a red marble at random is 0.4.

$\leftarrow P(R)$

- (i) Show that $3x - 2y = 16$.

[3]

R	Y	B	total
x	y	8	$x + y + 8$

$$\frac{x}{x + y + 8} = 0.4 \rightarrow x = \cancel{0.4x} + \cancel{0.4y} + 3.2$$

$$\quad \quad \quad -0.4x$$

$$\quad \quad \quad -0.4y$$

- (ii) Reuben triples the number of yellow marbles in the bag, without changing the number of red and blue marbles.
 The new probability of choosing a yellow marble at random is 0.6.

Find the values of x and y .

$$5(0.6x - 0.4y) = 3.2 \times 5$$

$$3x - 2y = 16 \quad - \textcircled{1}$$

R	Y	B	total
x	y	8	$x + y + 8$
	$\downarrow$ $\times 3$		
x	$3y$	8	$x + 3y + 8$

$$0.6 = \frac{3y}{x + 3y + 8}$$

(c)(ii) $x =$ _____ $y =$ _____ [5]

$$(x + 3y + 8) \cdot 0.6 = \frac{3y}{x + 3y + 8} \times \cancel{(x + 3y + 8)}$$

$$0.6x + 1.8y + \cancel{4.8} = \cancel{3y} - 4.8$$

$\quad -3y \quad \quad -4.8 \quad \quad -3y \quad -4.8$

$$10(0.6x - 1.2y) = -4.8 \times 10$$

$$\frac{6x}{6} - \frac{12y}{6} = \frac{-48}{6} \quad - \textcircled{2}$$

$$x - 2y = -8$$

$$3x - 2y = 16 \rightarrow \times 2$$

$$6x - 12y = -48$$

$$\begin{array}{r} \cancel{6x} - 4y = 32 \\ \cancel{6x} - 12y = -48 \\ \hline (-) \quad (+) \quad (+) \end{array}$$

$$8y = 80$$

$$y = 10$$

$$3x - 2y = 16$$

$$3x - 2(10) = 16$$

$\quad +20 \quad \quad +20$

$$3x = 36$$

$$x = \frac{36}{3} = 12$$

DM1: simplifying to $15y = 3x + 9y + 24$
 or $x - 2y = -8$
 or attempting to eliminate a variable by
 using (c)(i)
A1: $x = 12$ and $y = 10$