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2.1 Measures of central tendency

1. 550 450 300 400 450 500 450 300 600

a) mode - most common
= 450g

b) mean
$$\frac{550 + 450 + 300 + 400 + 450 + 500 + 450 + 300 + 600}{9}$$

= 444 g (3 sf)

c) median
Put data in ascending order:
300, 300, 400, 450, 450, 450, 500, 550, 600
Median = 450g

2.

Number of eggs	2	3	4	5	6
Frequency	6	11	13	7	2

a) mode - most common
= 4 eggs

b) mean
$$\bar{x} = \frac{\sum xf}{\sum f}$$
$$\bar{x} = \frac{(2 \times 6) + (3 \times 11) + (4 \times 13) + (5 \times 7) + (6 \times 2)}{6 + 11 + 13 + 7 + 2}$$

$$\bar{x} = \frac{144}{39}$$

$$\bar{x} = 3.69 \quad (3sf)$$

c) median

$6+11+13+7+2 = 39$

$\frac{39}{2} = 19.5$ th

$6+11 = 17$

$17+13 = 30$ ← where 19.5 lies

so median = 4

3.

Time, t (mins)	$10 \leq t < 15$	$15 \leq t < 20$	$20 \leq t < 25$	$25 \leq t < 30$
Frequency	5	14	7	2

a) modal class = $15 \leq t < 20$ (most common)

b) mean

midpoint × frequency

$10 \leq t < 15$	$12.5 \times 5 = 62.5$
$15 \leq t < 20$	$17.5 \times 14 = 245$
$20 \leq t < 25$	$22.5 \times 7 = 157.5$
$25 \leq t < 30$	$27.5 \times 2 = 55$

$$\frac{\Sigma \text{midpoint} \times \text{frequency}}{\Sigma \text{frequency}}$$

$$\frac{62.5 + 245 + 157.5 + 55}{5 + 14 + 7 + 2}$$

$$\frac{520}{28}$$

= 18.6 minutes (3 sf)

4. Total students = 13 girls + 11 boys = 24 pupils

Total height of girls = $13 \times 1.60\text{m} = 20.8\text{m}$

Total height of boys = $11 \times 1.71\text{m} = 18.81\text{m}$

Total height of pupils = $20.8 + 18.81 = 39.61\text{m}$

Mean height = $\frac{\text{total height}}{\text{total students}}$

$= \frac{39.61}{24}$

$= 1.65\text{m}$ (3sf)

5.

number of peas	4	5	6	7	8
frequency	12	15	18	11	7

a) Median

$12 + 15 + 18 + 11 + 7 = 63$

$\frac{63}{2} = 31.5$ th

$12 + 15 = 27$

$27 + 18 = 45$ ← where 31.5th lies

so median = 6

b) Mean

$\bar{x} = \frac{\Sigma xf}{\Sigma f}$

$\bar{x} = \frac{(4 \times 12) + (5 \times 15) + (6 \times 18) + (7 \times 11) + (8 \times 7)}{12 + 15 + 18 + 11 + 7}$

$\bar{x} = \frac{364}{63}$

$\bar{x} = 5.78$ (3sf)

c) Having 7 more peas will increase the mean

6.

Time, t (mins)	$2 \leq t < 4$	$4 \leq t < 6$	$6 \leq t < 8$	$8 \leq t < 10$
frequency	7	9	12	6

a) Modal class = $6 \leq t < 8$ (most common)

b) mean

midpoint × frequency	
$2 \leq t < 4$	$3 \times 7 = 21$
$4 \leq t < 6$	$5 \times 9 = 45$
$6 \leq t < 8$	$7 \times 12 = 84$
$8 \leq t < 10$	$9 \times 6 = 54$

$$\frac{\Sigma \text{ midpoint} \times \text{frequency}}{\Sigma \text{ frequency}}$$

$$\frac{21 + 45 + 84 + 54}{7 + 9 + 12 + 6}$$

$$= \frac{204}{34}$$

= 6 minutes

c) The mean is an estimate because the midpoint was used to estimate the time each customer in each class interval has spent in the store.

7.

Temp, t (°C)	$16 \leqslant t < 18$	$18 \leqslant t < 20$	$20 \leqslant t < 22$	$22 \leqslant t < 24$	$24 \leqslant t < 26$	$26 \leqslant t < 28$
frequency	1	3	2	9	13	3

a) modal class = $24 \leqslant t < 26$ (most common)

b) mean

midpoint	× frequency
$16 \leqslant t < 18$	$17 \times 1 = 17$
$18 \leqslant t < 20$	$19 \times 3 = 57$
$20 \leqslant t < 22$	$21 \times 2 = 42$
$22 \leqslant t < 24$	$23 \times 9 = 207$
$24 \leqslant t < 26$	$25 \times 13 = 325$
$26 \leqslant t < 28$	$27 \times 3 = 81$

$$\frac{\Sigma \text{ midpoint} \times \text{frequency}}{\Sigma \text{ frequency}}$$

$$\frac{17+57+42+207+325+81}{1+3+2+9+13+3}$$

$$= \frac{729}{31}$$

$$= 23.5\ ^\circ C \quad (3sf)$$