

S1 Unit 2 Measures of Location and Spread**Exercise 2D****Q5b** Use interpolation to estimate the 65th percentile.

31.85	P_{65}	16	34	40 - 50
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Time	Class boundary	Frequency	Cumulative Frequency
$20 \leq t < 30$	20 - 30	6	6
$30 \leq t < 40$	30 - 40	10	
$40 \leq t < 50$		18	34 P_{65}
$50 \leq t < 60$	50 - 60	13	47
$60 \leq t < 70$	60 - 70	2	49

$$P_{65} \text{ position} = \frac{65}{100} \times 49 = 31.85 \text{th data value}$$

(31.85th data value is in class $40 \leq t < 50$)

Lower boundary		Upper boundary
40	P_{65}	50
16	31.85	34
Cumulative frequency before P_{65} class		Cumulative frequency for P_{65} class

$$\frac{\text{Class boundary} - \text{Lower boundary}}{\text{Position} - \text{Cumulative frequency before } P_{65} \text{ class}} = \frac{\text{Upper boundary} - \text{Cumulative frequency for } P_{65} \text{ class}}{\text{Position} - \text{Cumulative frequency before } P_{65} \text{ class}}$$

$$\Rightarrow \frac{50 - 40}{31.85 - 16} = \frac{50 - 40}{31.85 - 16}$$

$$P_{65} = 48.8$$