





- 3 The times,  $t$  minutes, taken to complete a walking challenge by 250 members of a club are summarised in the table.

Time taken ( $t$ minutes)	$t \leq 20$	$t \leq 30$	$t \leq 35$	$t \leq 40$	$t \leq 50$	$t \leq 60$
Cumulative frequency	32	66	112	178	228	250

- (a) Draw a cumulative frequency graph to illustrate the data. [2]



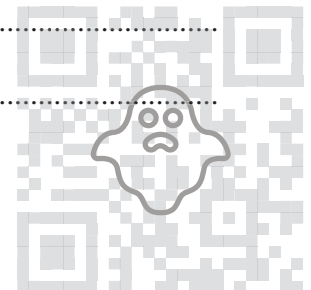
- (b) Use your graph to estimate the 60th percentile of the data. [1]

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- 4 Three fair 4-sided spinners each have sides labelled 1, 2, 3, 4. The spinners are spun at the same time and the number on the side on which each spinner lands is recorded. The random variable  $X$  denotes the highest number recorded.

(a) Show that  $P(X = 2) = \frac{7}{64}$ . [3]

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(b) Complete the probability distribution table for  $X$ . [2]

$x$	1	2	3	4
$P(X = x)$		$\frac{7}{64}$	$\frac{19}{64}$	

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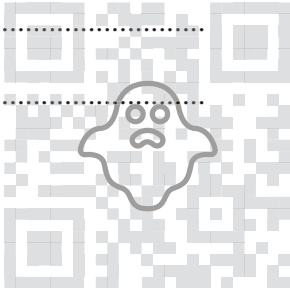
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On another occasion, one of the fair 4-sided spinners is spun repeatedly until a 3 is obtained. The random variable  $Y$  is the number of spins required to obtain a 3.

(c) Find  $P(Y = 6)$ . [1]

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(d) Find  $P(Y > 4)$ . [2]

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5 Company *A* produces bags of sugar. An inspector finds that on average 10% of the bags are underweight.

10 of the bags are chosen at random.

(a) Find the probability that fewer than 3 of these bags are underweight. [3]

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The weights of the bags of sugar produced by company *B* are normally distributed with mean 1.04 kg and standard deviation 0.06 kg.

(b) Find the probability that a randomly chosen bag produced by company *B* weighs more than 1.11 kg. [3]

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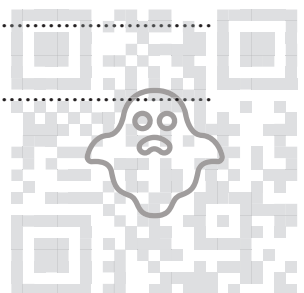
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81% of the bags of sugar produced by company *B* weigh less than  $w$  kg.

(c) Find the value of  $w$ . [3]

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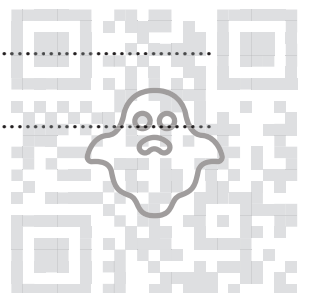
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6 (a) Find the number of different arrangements of the 9 letters in the word ACTIVATED. [2]

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(b) Find the number of different arrangements of the 9 letters in the word ACTIVATED in which there are at least 5 letters between the two As. [3]

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