

Cumulative Frequency Distribution

Example

1

The heights of 30 boys were measured correct to the nearest centimetre. The frequency distribution is as shown below.

Height (cm)	Frequency	Height (cm)	Frequency
$140 < x \leq 145$	2	$155 < x \leq 160$	8
$145 < x \leq 150$	5	$160 < x \leq 165$	3
$150 < x \leq 155$	11	$165 < x \leq 170$	1

Find the number of boys who are

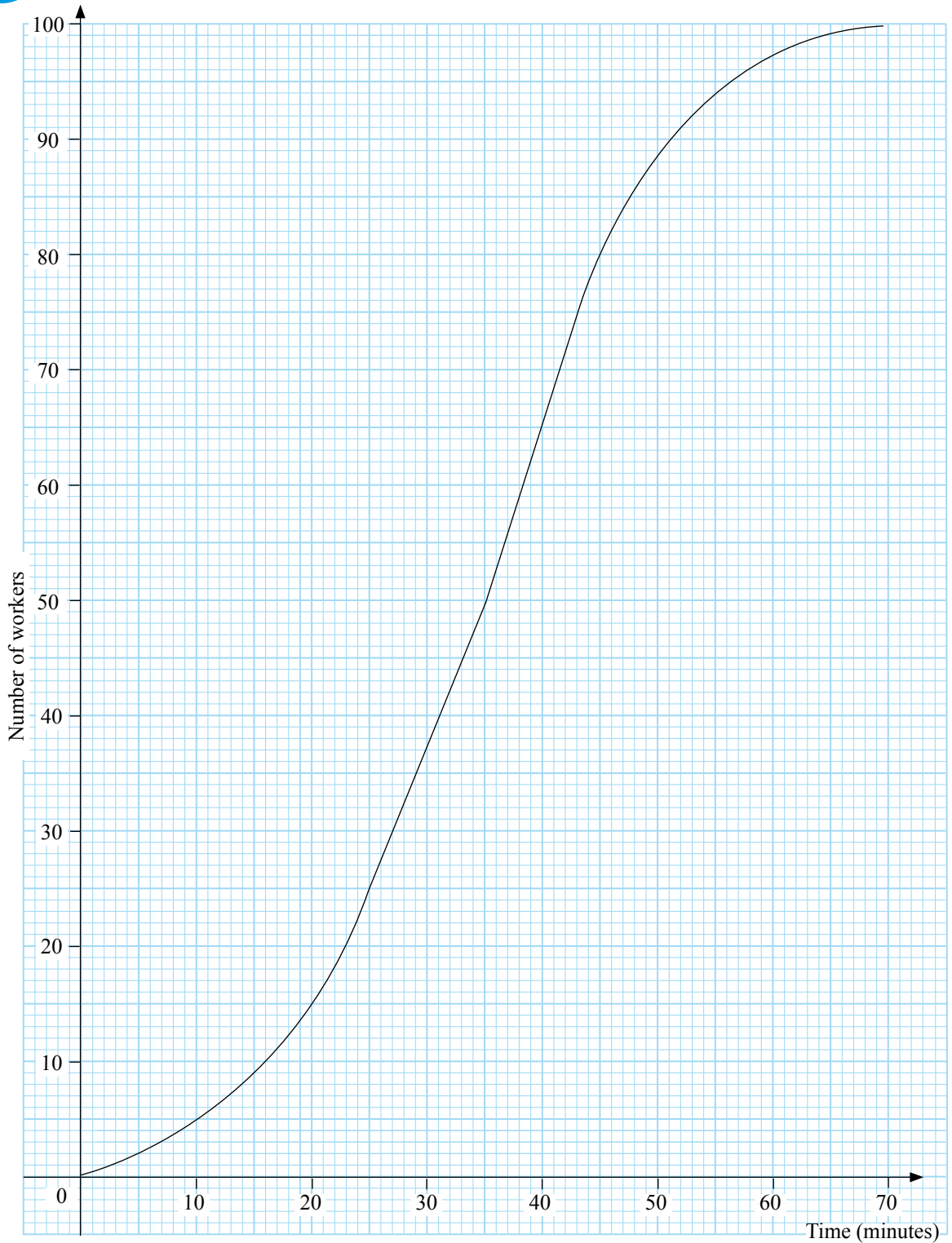
- (a) 160 cm or shorter in height,
- (b) more than 150 cm in height,
- (c) more than 145 cm but less than or equal to 160 cm in height.

Solution: (a) No. of boys $x \leq 160 = 2 + 5 + 11 + 8 = 26$
(b) No. of boys $x > 150 = 30 - (2 + 5) = 23$
(c) No. of boys $145 < x \leq 160 = 5 + 11 + 8 = 24$

Example

2

The amount of time spent by 100 workers to travel from home to the factory on a particular morning is shown in the cumulative frequency curve.



Adapted:

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From the graph, find

- (a) the number of workers who took less than 30 min to travel to the factory,
- (b) the fraction of workers who took at least 52 min to travel to the factory,
- (c) the value of x , given that 25% of the workers took at least x minutes to travel to the factory.

Solution: (a) From the graph, 37 workers took less than 30 min.

(b) From the graph, 91 workers took less than 52 min.

Fraction of workers who took more than 52 min.

$$= \frac{100 - 91}{100}$$

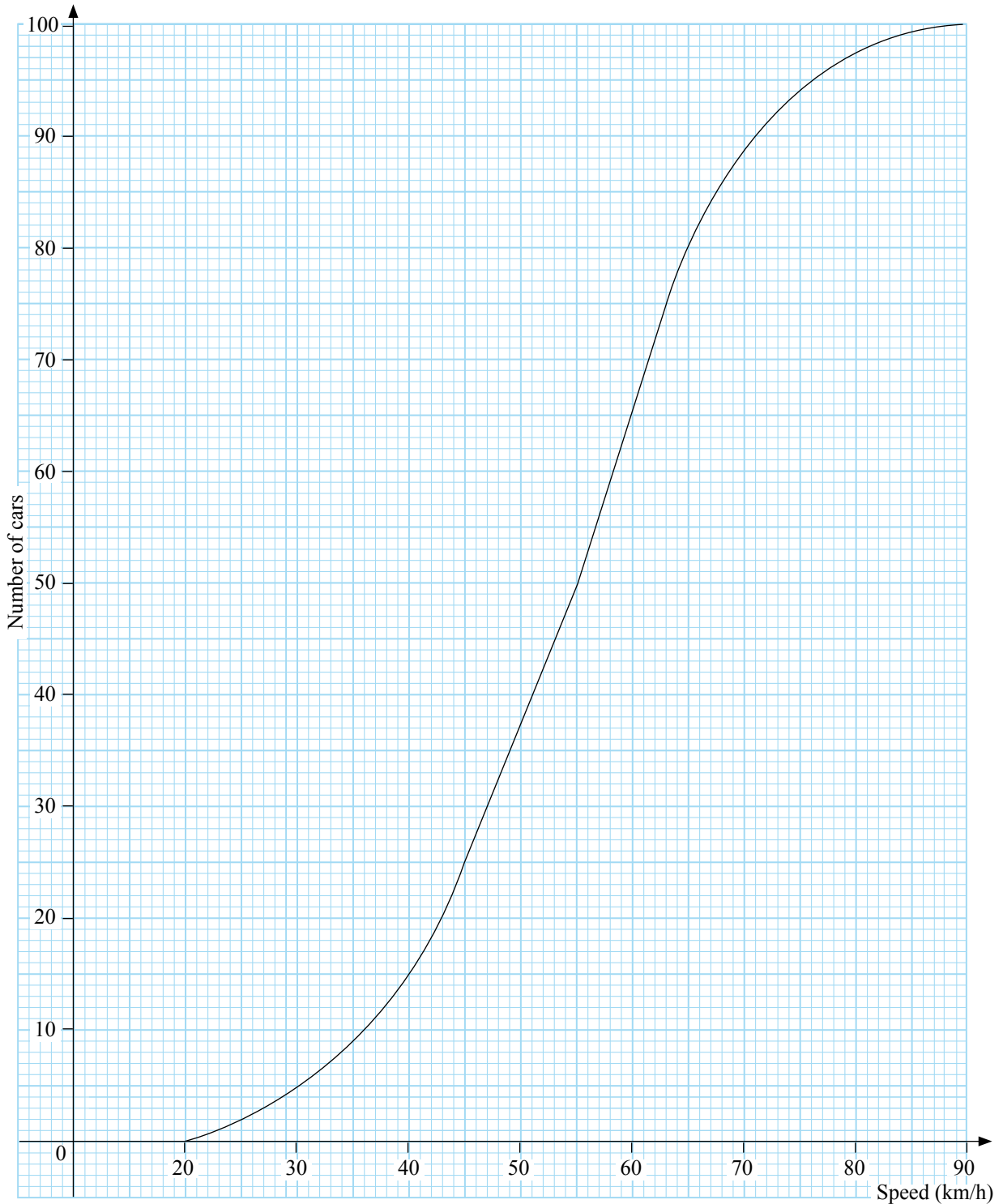
$$= \frac{9}{100}$$

(c) From the graph, at $(100 - 25) = 75\%$, time taken is 43 min. So, $x = 43$.

Example

3

On a particular day, the speeds at which 100 cars pass a certain point on a road are recorded. The cumulative frequency curve showing the speed (km/h) and the number of cars is shown below.



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Use the graph to estimate

- (a) the number of cars travelling at a speed less than 56 km/h,
- (b) the number of cars which are speeding, given that the maximum speed limit of the road is 70 km/h,
- (c) the value of x if 40% of the cars are travelling at less than x km/h.

Solution:

- (a) From the graph, cars with speed less than 56 km/h = 53.
- (b) From the graph, cars with speed less than 70 km/h = 89.
Cars with speed more than 70 km/h = $100 - 89 = 11$.
- (c) From the graph, 40% of cars are travelling at less than 51 km/h.
So, $x = 51$.