

Science understanding

 Logical/mathematical  Verbal/linguistic

Reflex actions seem to happen very fast, while all the other actions by the body in response to danger seem to take much longer. Sometimes you process the information very quickly, so the reaction appears to be very fast.

You are travelling very fast on your skateboard or bike and suddenly see someone walk in front of you. You have to make judgements about how far away the person is, what actions you can take to avoid them, which action is the best in the situation, and do you have the time and skills to carry it out. You then have to follow through on your decision.

The time it takes for you to do all these things is your *reaction time*.

Experiments show that when you are attentive you have a reaction time of between 0.2 and 0.5 seconds. However, the police estimate that the average driver takes up to one second to react in an emergency.

Once you have reacted, you have to bring your skateboard or bike to a stop. The distance you travel before stopping is the *reaction distance*. This distance depends on your reaction time and the speed at which you are travelling.

Note: reaction distance (metres, m) = reaction time (seconds, s) \times speed (metres/second, m/s)

1 Calculate the reaction distance for each situation in the table below.

Speed (m/s)	1.7	4.2	11.1	13.9	27.8	5.6
Speed (km/h)	6	15	40	50	100	20
What travels at this speed	walking	running	car in school zone	car in residential street	car on highway	recreational cyclist
Reaction time (s)	1	0.7	0.5	0.5	0.7	0.6
Reaction distance (m)						

2 Consider what would happen if a driver was distracted and took longer to react. Calculate the reaction distances with the slower reaction times in the table below.

Speed (m/s)	11.1	11.1	13.9	13.9	27.8	27.8
Speed (km/h)	40	40	50	50	100	100
What travels at this speed	car in school zone	car in school zone	car in residential street	car in residential street	car on highway	car on highway
Reaction time (s)	1.5	2	1.5	2	1.5	2
Reaction distance (m)						

3 Deduce why speed limits are lower (40–50 km/h) near schools and in residential streets.

4 Propose factors that reduce the attentiveness of drivers:

(a) in a school zone

(b) in a residential street

(c) on a highway.