Exercise 6

Using the Acceleration Equation

1. What does an acceleration of $5ms^{-2}$ mean? (1)

2. During a game of ten-pin bowling, a player gives bowling ball an acceleration of 3 ms^{-2} for 1.2 s.
   Assuming the bowling ball was accelerated from rest, calculate the final velocity of the bowling ball. (3)

3. A supertanker travelling at 13 ms^{-1} decelerates at a rate of 0.03 ms^{-2}.
   How long does it take to come to a complete stop?(3)

4. A rocket accelerates at 5.2 ms^{-2} for 10 minutes to reach a final velocity of 6200 ms^{-2}. Calculate the initial velocity of the rocket.(3)

Exercise 6
Using the acceleration equation.

1. An acceleration of $5 ms^{-2}$ means the speed is increasing by $5 ms^{-1}$ every second.

2. $a = \frac{v-u}{t}$

$3 = \frac{v-0}{1.2}$

$3 \times 1.2 = v - 0$

$\underline{v = 3.6 ms^{-1}}$

3. $a = \frac{v-u}{t}$

$-0.03 = \frac{0-13}{t}$

need this "-" as taxi is decelerating.

$-0.03t = -13$

$t = \frac{-13}{-0.03}$

$\underline{t = 433s.}$

4. $a = \frac{v-u}{t}$

10 Minutes = 600s

$5.2 = \frac{6200-u}{600}$

$5.2 \times 600 = 6200 - u$

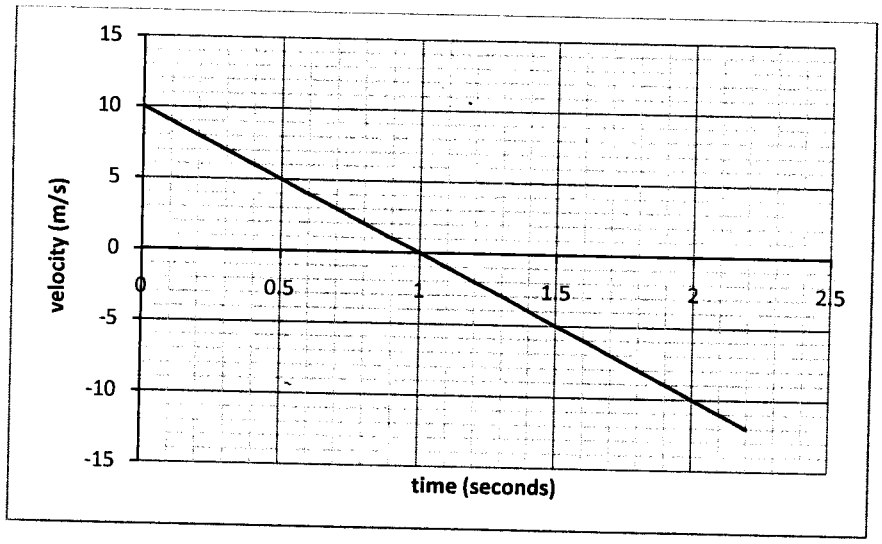
$u = 6200 - (5.2 \times 600)$

$\underline{u = 3080 ms^{-1}}$

Exercise 8

The Bouncing Ball

1. The velocity-time graph shown below describes the motion of a ball which has been thrown straight up into the air then allowed to fall to the ground.



(a)State the direction of the ball from zero to 1s(1)

(b)State the direction of the ball from 1s to 2.2s(1)

(c)At what time does the ball reach its maximum height from its starting point? (1)

(d)Calculate the maximum height that the ball reaches from the throwers hand.(3)

(e) Use the graph to find the time the ball takes to fall from its highest point until it hits the ground (1)

(f) Calculate the distance the ball falls from its highest point until it hits the ground(3)

Exercise 8.
The bouncing ball.

1. (a) upwards

(b) downwards

(c) Maximum height at $t = 1s$.

(d) Maximum height = area under graph from $0 \rightarrow 1s$

$= \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{1}{2} \times 1 \times 10$

$= \underline{5M.}$

(e) $2.2 - 1 = \underline{1.2s}$

(f) distance ball falls = area under graph from $1s \rightarrow 2.2s$.

$= \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{1}{2} \times 1.2 \times (-12)$

$= -7.2M.$

↑ -ve sign because the ball is falling downwards

<u>the ball falls 7.2M</u>