INVERSE PROPORTION
APPLICATIONS
DRAG CAR IMAGES

Fuel can only burn when it mixes with air. In drag car engines, the engine temperature can reach up to 2400^0C. Even at such hot temperatures, very rich fuel mixtures only burn relatively slowly because there is less air inside the engine than there is outside the car. This means that some remaining nitro-methane fuel can escape from the exhaust pipe. When it mixes with the air outside, it can explode and produce bright yellow flames.

Movie cameras that capture the exciting moment when flames are released from the exhausts can be damaged if the light intensity is too high. For example, the light intensity of a flame can be as high as 1 million lux, the same brightness as staring at the sun. Camera manufacturers must test their equipment prior to sale.

Light intensity is inversely proportional to the square of the distance from the object. This means that if you move 2 metres away from the flame, the light intensity will only be $1/2^2$ or 1/4 of the intensity directly next to the flame. This is shown in the table.

DISTANCE FROM FLAME	0 metres	2 metres	4 metres	6 metres
INTENSITY OF LIGHT REACHING CAMERA	1000000 Lux	$1/2^2$ X 1000000 = 1/4 x 1000000 = 250000 Lux	$1/4^2$ X 1000000	$1/6^2$ X 1000000

Q1.In the table above, calculate the light intensity at a distance of 8 metres from the flame.

Q2. On the next page, draw a line graph that plots the distance from the flame (x-axis) against the light intensity (y-axis). Remember to label the axes correctly with the appropriate units.

Q3. From the graph, find the light intensity at a distance of:
(a) 5 metres
(b) 9 metres.

Q4. Movie cameras will be undamaged when the light intensity reading is 10000 Lux. What distance from the drag car flame is this?

ANSWERS

Q1. 15625 Lux

Q3.(a)40000 Lux
(b)12345.68 Lux

Q4. 10 metres