Shedding Light on Motion Episode 2: Acceleration **Name: _____**

Part A

1. What is acceleration?

_____

_____

Part B

2. Write down the formula for acceleration in words and in symbols.

3. Calculate the average acceleration of
   (i) a car that accelerates from 40 km/hr to 100 km/hr in 10 seconds:

   (ii) of a train that accelerates from zero to 60 km/hr in 30 seconds:

   (iii) a cyclist who, at the top of a hill, is travelling at 5m/s and 14 seconds later is travelling at the bottom of the hill at 12 m/s:

   (iv) a car which takes 20 seconds to come to a complete stop from 100 km/hr.

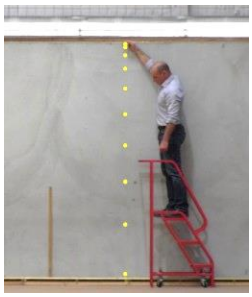
4. A train moves away from a station with an acceleration of **2 km/hr/s** for 30 seconds. Fill in the table below. (Note: to convert km/hr to m/s you must divide by 3.6)

Time (s)	Speed (km/hr)	Speed (m/s)
0		
1		
2		
3		
10		
30		

5. What was the train's acceleration in m/s/s? _____ (The answer is in the table above.)
6. If a car has a **deceleration** of 5 m/s/s, we can write that its acceleration, a = _____.
7. A train approaching a station at **60 km/hr <u>slows down</u>** with an acceleration of **-4 km/hr/s**. Fill in the table below.

Time (s)	Speed (km/hr)	Speed (m/s)
0		
1		
2		
3		
10		
15		

Part C



8. The photo on the left shows the position of a falling golf ball at 0.08 second intervals. What is happening to the golf ball and how can you tell?

_____

_____

_____

_____

9. A ticker tape was pulled to the **left** by a toy car and a ticker timer left marks like the ones shown. Describe the movement of the toy car.

. . . . . .

_____

_____

10. The acceleration of **any** falling object that is close to the Earth's surface is _____ m/s/s which equates to _____ km/hr/s. (assuming air resistance is negligible)
11. The acceleration of a 5 kg medicine ball is greater than / equal to / less than that of a 700 g basketball. (circle the correct answer and cross out the incorrect answers and assume that air resistance is negligible)
12. What effect does air resistance have on a falling object's acceleration?

_____

_____

_____

13. A ball is dropped from a tall building. Fill in the table below.

Time (s)	Speed (m/s)	Speed (km/hr)	Distance Fallen (m)
0			
1			
2			
3			

14. Rearrange the formula that expresses the relationship between acceleration (a), change in velocity (Δv) and time (t) (your answer to Q2) so as to make Δv the subject.

15. A person steps off a series of platforms into a pool. Fill in the table below.

Height of Platform (m)	Acceleration (m/s/s)	Free-Fall Time (s)	Speed on Impact	
			Calculation	Result (m/s)
3	9.8	0.78	9.8 x 0.78	7.6
5	9.8	1.02		
7.5	9.8	1.24		
10	9.8	1.43		

Part D

16. An acceleration of 9.8 m/s/s is sometimes referred to as _____.
17. A rocket orbiting the Earth accelerates from 6400 m/s to 7600 m/s in one minute. Calculate its acceleration in m/s/s and in g's.

18. A car travelling at 70 km/hr crashes into another car and comes to a complete stop in 0.5 seconds. Calculate the car's deceleration in m/s/s and in g's. (HINT: watch your units)