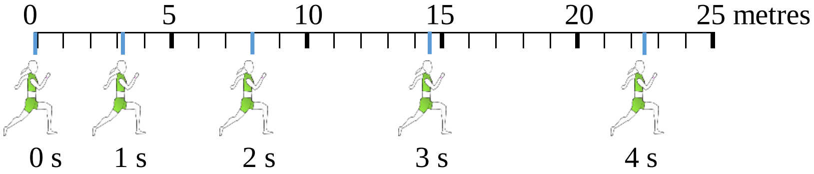
 Name: ______________________

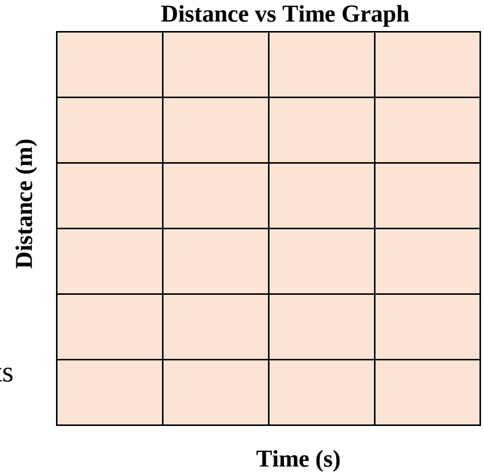
Part A

1. Motion graphs give information about (a) an object's position, (b) its _________________ and (c) its _______________________.

Part B

2. A sprinter gradually accelerates from rest. The graphic below shows her position every second for 4 seconds.





(a) How far had she run after running for…

(i) 1 s? __________ (ii) 2 s? __________

(iii) 3 s? __________ (iv) 4 s? __________

(b) Draw a distance vs time graph of the information. Connect the dots with a smooth curve (a "line of best fit")

(c) How far did she run in the…

(i) 1st second? _______________

(ii) 2nd second? _______________ (between the 1s mark and the 2s mark)

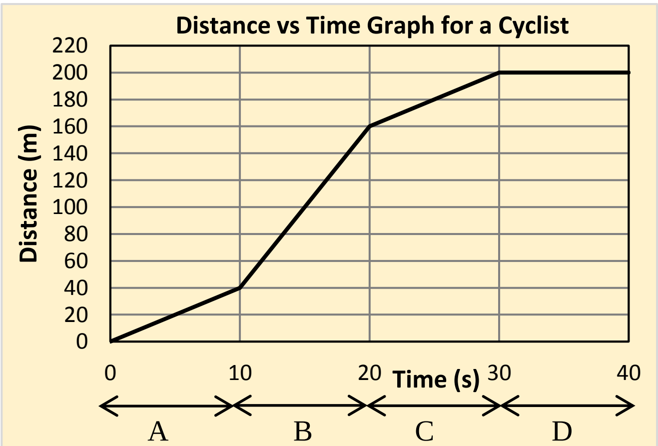
(iii) 3rd second? _______________

(iv) 4th second? _______________

3. What do your answers to Q2 tell you about the athlete's speed during the first 4 seconds?

____

____



4. The Distance vs Time graph on the left shows information about a short trip made by a cyclist.

(a) How far had the cyclist gone after …

(i) 10 s? __________ (ii) 20 s? _________

(iii) 30 s? _________ (iv) 40 s? __________

(b) How much distance did the cyclist cover during

(i) Section A? ________ (ii) Section B? ________

(iii) Section C? ________ (iv) Section D? ________

(c) What was the cyclist's speed during…

(i) Section A? ________ (ii) Section B? ________ (iii) Section C? ________ (iv) Section D? _______

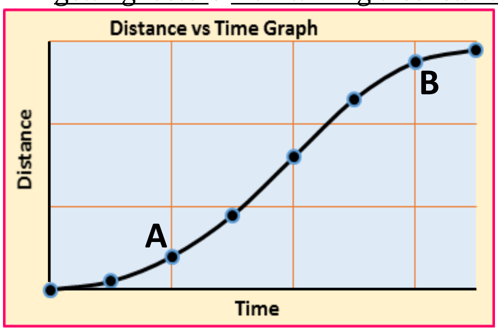
5. How does the gradient of a distance vs time graph compare with the object's speed?

____

____

6. A straight line on a distance vs time graph tells you that the object is…

getting faster / maintaining a constant speed / slowing down. (Circle the correct response.)



7. A line which curves upwards (with the gradient increasing), like at Point A, on a distance vs time graph indicates that the object is…

getting faster / maintaining a constant speed / slowing down.

(Hint: compare this graph to the graph in Q2)

8. A line which levels out (becomes less steep), like at Point B, on a distance vs time graph indicates that the object is…

getting faster / maintaining a constant speed / slowing down.

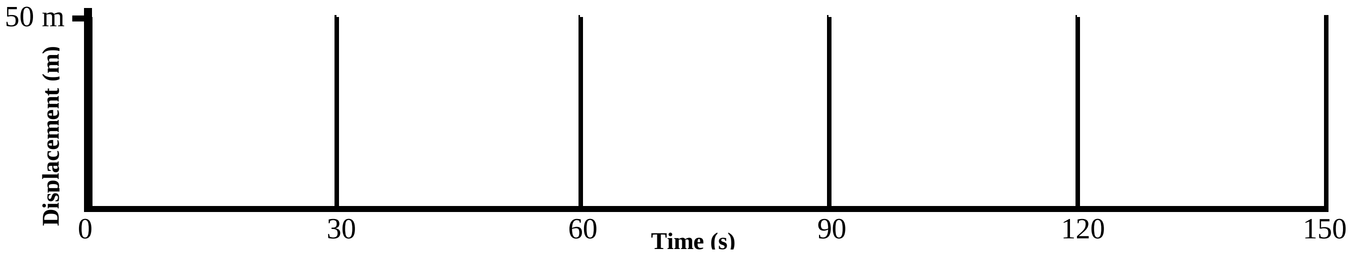
9. When we're talking Physics, what is the difference between distance and displacement?

____

____

10. The **200m Individual Medley** in swimming competitions requires a swimmer to swim four strokes: butterfly, backstroke, breaststroke, and freestyle. Each stroke is used for **50 m**.
In the table below are Australian swimmer Alicia Coutts's "split times" (recorded at the end of each 50m leg) of her final race in the 2012 London Olympics.
Fill in the rest of the table and draw a **Displacement vs Time** graph (not a distance vs time graph).
Assume that she swam at a constant velocity during each leg.

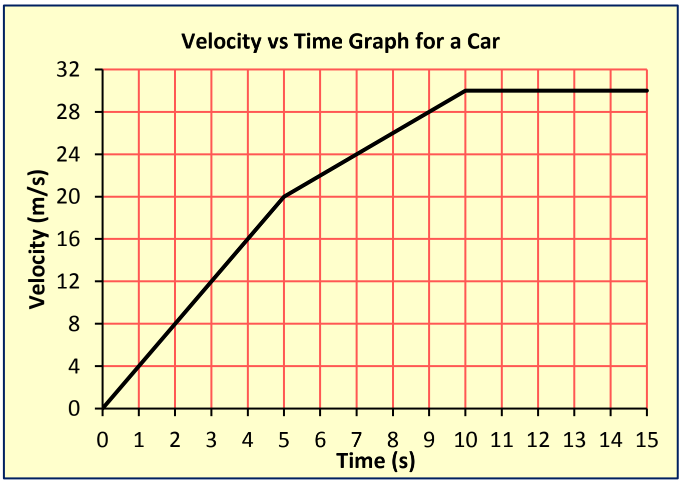
Stroke	**Elapsed Time (Split Times)** (in min:sec)	**Elapsed Time (Split Times)** (in seconds)	**Time for each 50m leg (Lap Times)** (seconds)	**Average Velocity during each 50m leg** (m/s)	**Distance Swum at the End of the Leg** (m)	**Displacement at the End of the Leg** (m)
butterfly	28.12	28.12			50	50
backstroke	1:01.22	61.22			100	0
breaststroke	1:38.24					
freestyle	2:08.15					



11. What distance did Alicia Coutts swim in her Individual Medley race? ___________________________

12. What was her displacement at the end of the race? ________________________

Part C The velocity vs time graph for a certain car is shown below. Use the graph to answer Question 13 -17.



13. By reading off the graph, state the velocity of the car after…
    (i) 1 second? _______________________
    (ii) 2 seconds? _______________________
    (iii) 5 seconds? _______________________
    (iv) 6 seconds? _______________________
    (v) 12 seconds? _______________________

14. What does the gradient of the line on a velocity vs time graph tell you?

____

____

____

15. What is the acceleration of the car between…
    (a) the start and the 5-second mark? (see your answer to Q14 and remember that a = $\Delta v/t$)

    (b) the 5-second mark and the 10-second mark?

    (c) the 10-second mark and the 15-second mark?

16. What does the area under the line on a velocity vs time graph tell you?

____

____

____

17. How far had the car travelled…
   (a) between the start and the 5-second mark? (Hint 1: Draw the outline of the area you need on the graph and shade it in. Hint 2: $A = \frac{1}{2}bh$)

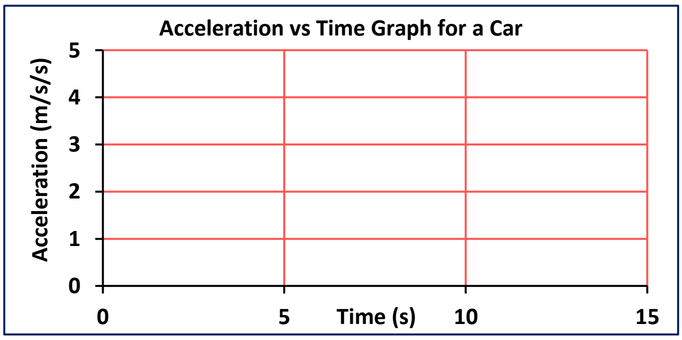
   (b) between the 5-second mark and the 10-second mark? (Draw the outline of the area that you need)

   (c) between the 10-second mark and the 15-second mark?

18. Use your answers to Q17 above to calculate the total distance that the car travelled in 15 seconds.

Part D

19. Use your answers from Q15 above to draw an acceleration vs time graph for the car referred to in Qs 13-17.



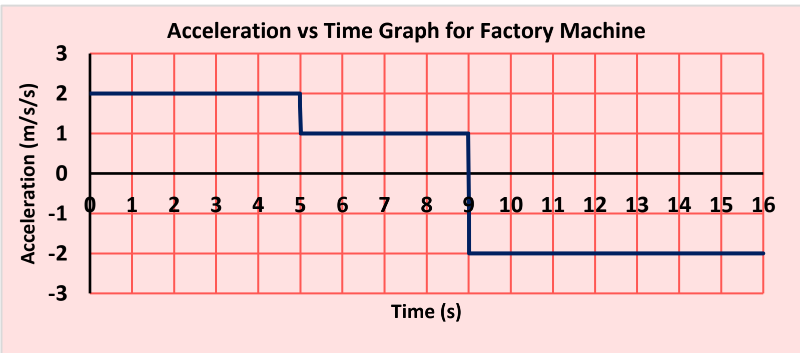
20. What does the area under an acceleration vs time graph tell you about the object?

____

____

____

21. Below is an acceleration vs time graph for a machine that operates in a factory.



(a) By finding the area under the graph as appropriate (and assuming that the object's initial velocity is zero), calculate the object's <u>velocity</u> after…

(i) 1 second. _________________________

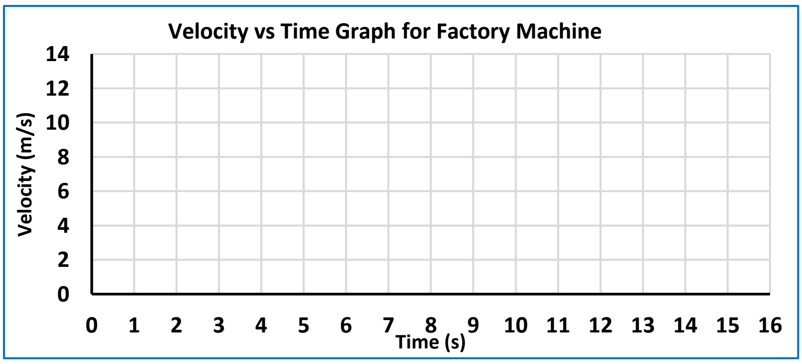
(ii) 2 seconds. _________________________

(iii) 5 seconds. _________________________

(iv) 9 seconds. _________________________

(v) 10 seconds. _________________________

(vi) 16 seconds. _________________________



(b) Use the a-t graph and your answers to Q21 (a) above to draw up the machine's velocity vs time graph. **Assume that the initial velocity is 0 m/s.**