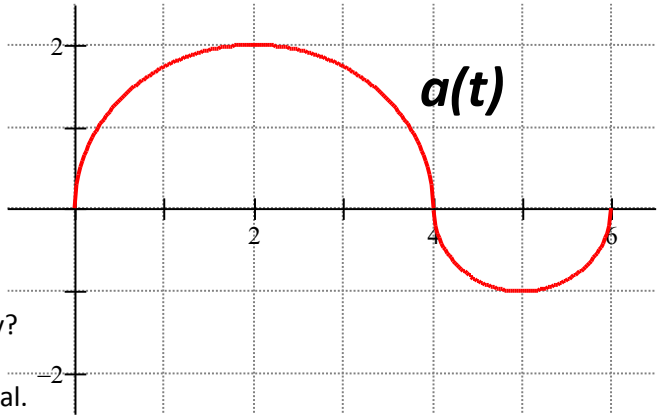
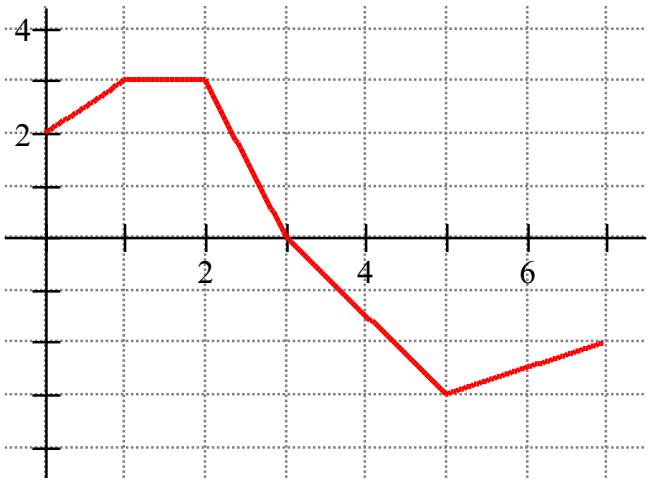
Particle Motion - DAY 3
Calculus AB
HARTER

Name _____

The acceleration of a particle over 4 seconds is graphed at the right measured in m/s^2. The velocity of the particle at t = 0 is -5.



1. Find the velocity at t = 2 and t = 5 .
2. Is the speed increasing or decreasing at t = 2 and t = 5? Why?
3. Find the average acceleration over the 6 second time interval.
4. At what time t is the particle's minimum velocity?
5. At what time t is the particle's maximum velocity?



The velocity of a particle over 7 seconds is graphed at the right measured in m/s. The position of the particle at t = 0 is 4.

6. When does the particle change directions? Justify your answer.
7. What is the acceleration at t = 4.2?
8. Is the speed of the particle increasing or decreasing at t = 4.2? Why?
9. What is the total distance that the particle travels over the 7 seconds?
10. What is the position of the particle at t = 3 and t = 7.
11. What is the ***average velocity*** of the particle over the 7 seconds?
12. What is the ***average acceleration*** over the 7 seconds?

A particle moves along the x-axis so that its position is given by $x(t)=t^3-t^2-2$

13. At what time is the particle at rest?
14. During what interval is the particle moving right? JYA
15. Find the position of the particle when the acceleration is 4.
16. What is the speed of the particle at t = ½
17. What is the acceleration when the velocity is 1?

A particle moves along the x – axis in such a way that the acceleration at time t for t > 0 is given by $a(t) = 2t - 1$. When t = 2, the position of the particle is 4 and the velocity is 1.

18. Write an equation for the velocity, v(t), of the particle for all t > 0.
19. Write an equation of the position, x(t) of the particle for all t > 0.
20. Find the position of the particle when t = 1.
21. Find the average acceleration from t = 0 to t = 2.
22. Find the average velocity from t = 0 to t = 2.

CALCULATOR

A velocity of a particle as it moves along the x-axis is described by $v(t) = 2\cos(0.865x - 3)$ from t = 0 seconds to t = 5 seconds. At t = 0, the position of the particle is -2.

23. Find the particle's acceleration at t=1.
24. Is the particle speeding up or slowing down at t = 1. EXPLAIN.
25. When is the particle at rest?
26. What is the total distance that the particle covers in the 5 seconds?
27. What is the average velocity of the particle during the 5 seconds?
28. What is the average acceleration of the particle over the 5 seconds?
29. When is the particle moving left?
30. What it's the particle's position over the interval at t = 5.

Integrate:

31. $\int \frac{\cos x}{\sin^3 x}\, dx$

32. $\int x\sqrt{3x^2 + 3}\, dx$

ANSWERS

1. -5 + π, -5 + 1¾ π
2. At t = 2: neg vel,pos acc, SLOWING DOWN
   At t = 5; pos vel, neg acc, SLOWING DOWN
3. π/4
4. 0
5. 4
6. At t = 3, velocity switches from positive to negative
7. -3/2
8. Neg acc, neg velo, SPEEDING UP
9. 15
10. At t = 3; 11
    At t = 7; 3
11. -1/7
12. -4/7
13. t =0, 2/3
14. $(2/3,\infty)$ velocity is positive – you should make a chart!
15. -2
16. ¼
17. 4
18. $v(t)=t^2-t-1$
19. $x(t)=\frac{1}{3}t^3-\frac{1}{2}t^2-t+\frac{16}{3}$
20. 25/6
21. 1
22. -2/3
23. 1.462
24. Neg velocity, pos acceleration, SLOWING DOWN
25. 1.652
26. 6.541
27. 0.514
28. 0.493
29. (0, 1.652)
30. 0.257 (-2+2.25689)
31. $-\frac{1}{2}\csc^2 x+C$
32. $\frac{1}{9}\left(3x^2+3\right)^{3/2}+C$