

Constant Acceleration

Conceptual Questions

1. Acceleration is the rate at what is happening?
2. What are three ways you can accelerate? (Is acceleration a vector or scalar?)
3. If an object has an acceleration of 0, what kind of motion does are you moving with?
4. If you are driving and the speedometer always reads 20 mph, could you be accelerating? Explain.
5. What is true about the sign of velocity and acceleration if you are speeding up? Slowing down?

Problems (Use the G/U table and equations)

1. If a cheetah can maintain a constant velocity of 25 m/s, what is the cheetah's acceleration? Why?
2. Mr. Gallardo is driving a car that is initially at rest. The car speeds up by 3.0 m/s every second for 15 seconds.
 - a. What is the acceleration of the car?
 - b. What will be the car's final velocity at the end of the 15 seconds?
3. Mr. Eisenstadt's car is initially traveling at 11 m/s. If the car slows down at the rate of 2 m/s every second, how fast will the car be going after 3.0 s?

4. Ms. Brown accelerates her car from 50 km/hr. to 65 km/hr. in 5 seconds. Ms. Cordova accelerates her car from rest to 15 km/hr. in the same amount of time. Whose car undergoes the greatest acceleration? Explain.
5. Ms. Petrollini is walking to her hairdresser at 1.3 m/s when she glances at her watch and realizes that she is going to be late for her appointment. Ms. Petrollini gradually quickens her pace at a rate of 0.09 m/s^2 . What is Ms. Petrollini speed after 10 seconds?
6. Mr. Drouin was a police officer before becoming a math teacher. One day, he is cruising in his patrol car that is moving with an initial speed of 25 m/s when a stolen car zooms by. To catch it, Mr. Drouin speeds up to 45 m/s in 6.5 seconds. What was the acceleration of the Mr. Drouin's police car?
7. Starting from rest, Ms. Farulla speeds up on a bike with a constant rate of 0.8 m/s/s .
- How long will it take Ms. Farulla to reach a speed of 4 m/s?
 - How fast will Ms. Farulla be going after 12 seconds?

8. Ms. Moore is traveling in a plane at 300 m/s. The plane slows down at a rate of 2.5 m/s each second.
 - a. How fast is the plane the going after 20 seconds?
 - b. How long will it take the plane to reach a speed of 180 m/s?

9. Mr. Schuck is driving in a car with an initial speed of 20 km/h and undergoes a constant acceleration of 4 km/h/s.
 - a. How fast is the car going after 3 seconds?
 - b. How much total time would it take the car to reach a speed of 80 km/h?

10. Mr. Gershon is driving in a car on the highway and constantly accelerates from an initial speed of 20 m/s to a final speed of 30 m/s over a time of 5 seconds.
 - a. What was the car's acceleration?
 - b. How far did the car travel during this 5 seconds?

11. Ms. Heft is flying a Boeing 767 airplane which can accelerate at a rate of 3.3 m/s^2 . If the 767 starts from rest,
 - a. How many seconds will it take to reach a take-off speed of 100 m/s?
 - b. How far would it travel in that time?

12. Mr. Ost is on a skateboard and constantly accelerates from rest, covering a distance of 20 meters in a time of 3.0 seconds.
- What was Mr. Ost's acceleration?
 - What was her final velocity?
13. Mr. Kozak is riding his scooter with a speed of 5 m/s. He then constantly accelerates at a rate of 2 m/s^2 until he reaches a speed of 10 m/s.
- How long will it take him to reach a speed of 10 m/s?
 - How far will he travel in that time?
14. Mr. McKay is longboarding down Amsterdam Avenue with a velocity of 18 m/s when a small child jumps out in front of him, and he slams on the brakes to stop. If his acceleration is a constant rate of -1.5 m/s^2 ,
- How fast is Mr. McKay going after 4 seconds?
 - How many total seconds will it take him to stop?
 - How far does he travel before he comes to rest?
 - Why is his acceleration negative?

15. Mr. Premvaree is on a ice skating rink. His initial velocity is zero when Mr. Eisenstadt comes along and lightly pushes Mr. Premvaree with a constant acceleration across the ice. If Mr. Premvaree traveled a distance of 20 m in 8 s,
- What is Mr. Premvaree's acceleration across the ice skating rink?
 - What is Mr. Premvaree's final velocity after the 8 seconds?
16. Ms. Aguis is driving a car across a flat parking lot. She is traveling at -20 m/s when she shifts into neutral and coasts to a stop. A constant acceleration makes the car stop 8.0 seconds after she shifts into neutral.
- What is the acceleration of the car?
 - Why is the acceleration positive?
 - How far did the car coast?
17. Ms. Cheung, a happy math teacher, is leaving school for the day. Ms. Cheung gets onto the bus which uniformly accelerates from rest with an acceleration of 1.2 m/s^2 .
- How long does it take the bus to reach a speed of 15 m/s?
 - How far does the bus travel in this time?

18. Mr. Sinchi is riding his bike which is uniformly accelerated at the rate of 2.5 m/s^2 for 12 s.
- If the original speed of the bike is 8 m/s, what is its final speed?
 - How far does the bike travel in this time?
19. Mrs. Waller is riding her road bike and decreases speed uniformly from 55 m/s to 44 m/s in 11 seconds.
- What is the acceleration of the bike?
 - How far does Mrs. Waller travel during this time?
20. Ms. Pam is riding her motorcycle with a speed of 14 m/s, when she slows down to a rest in 7 seconds.
- What is Ms. Pam's acceleration?
 - How far does Ms. Pam travel while slowing down?

21. Ms. Walsh rolls a ball down an incline with an initial speed of 2.2 m/s. If it took 0.75 s to go down the incline and has a uniform acceleration of 4.2 m/s^2 ,
- How long is the incline?
 - How fast is the ball moving at the bottom of the incline?
22. Luisa is driving cross country on an epic road trip. Luisa starts by traveling west at 44 m/s when unfortunately she encounters some traffic. After 11 seconds, Luisa is traveling 22 m/s west.
- What is Luisa's acceleration?
 - What is the direction of the acceleration?
 - What distance does the car travel over this time?
 - What is the first song on her road trip playlist?

2. a) 3 m/s^2 b) 45 m/s
3. 5 m/s
5. 2.2 m/s
6. 3.07 m/s^2
7. a) 5s b) 9.6 m/s
8. a) 250 m/s b) 48 s
9. a) 32 km/h b) 15 s
10. a) 2 m/s^2 b) 125 m
11. a) 30.3 s b) 1514.8 m
12. a) 4.44 m/s^2 b) 13.32 m/s
13. a) 2.5 s b) 18.75 m
14. a) 12 m/s b) 12 s c) 108 m
15. a) 0.625 m/s^2 b) 5 m/s
16. a) 2.5 m/s^2 b) 80 m
17. a) 12.5 s b) 93.75 m
18. a) 38 m/s b) 276 m
19. a) -1 m/s^2 b) 544.5 m
20. a) -2 m/s^2 b) 49 m
21. a) 2.83 m b) 5.35 m/s
22. a) -2 m/s^2 c) 363 m