MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) A car travels 95 km to the difference betwee	o the north at 70.0 km/h, on the average speed and	then turns arour the average velo	nd and travels 21.9 ocity on this trip?	km at 80.0 km/h. What is
A) 24 km/h	\overrightarrow{B}) 32 km/h	C)	19 km/h	D) 27 km/h
2) The following conver	rsion equivalents are give	en:		
1 gal = 231 in ³	$1 \text{ ft} = 12 \text{ in} \qquad 1 \text{ min}$	n = 60 s		
A pipe delivers wate	r at the rate of 95 gal/mir	n. The rate, in ft ³	/s, is closest to:	
A) 0.15	B) 0.21	C) 0.19	D) 0.17	E) 0.14
3) A CD-ROM disk can bytes of storage, how A) 5.4 × 10 ⁹ words	store approximately 600 many words can be stor B) 2.0 × 10 ⁹ wo	0 megabytes of i ed on one disk? ords C)	information. If an a	average word requires 9.0 D) 6.7 × 10 ⁷ words

4) A train starts from rest and accelerates uniformly, until it has traveled 5.6 km and acquired a velocity of 42 m/s. The train then moves at a constant velocity of 42 m/s for 420 s. The train then slows down uniformly at 0.065 m/s², until it is brought to a halt. The acceleration during the first 5.6 km of travel is closest to: A) 0.19 m/s² B) 0.20 m/s² C) 0.14 m/s² D) 0.16 m/s² E) 0.17 m/s²

5) An oak tree was planted 22 years ago. How many seconds does this correspond to? (Do not take leap days into account.)

A) 1.2×10^7 B) 6.9×10^8 C) 2.9×10^7	D) 2.8×10^8
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6) Bob and Biff throw identical rocks off a tall building at the same time. Bob throws his rock straight downward. Biff throws his rock downward and outward such that the angle between the initial velocity of the rock and the horizon is 30 degrees. Biff throws the rock with a speed twice that of Bob's rock. Which rock hits the ground first (assume the ground near the building is flat)?

A) Bob's rock C) Biff's rock B) They hit at the same time. D) Impossible to determine #:

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7) Shown here are the velocity and acceleration vectors for an object in several different types of motion. In which case is the object's velocity changing while its speed is not changing?



E) None of these cases

8) A ball is projected upward at time t = 0.0 s, from a point on a roof 60 m above the ground. The ball rises, then falls and strikes the ground. The initial velocity of the ball is 28.4 m/s. Consider all quantities as positive in the upward direction. At time t = 4.3 s, the acceleration of the ball is closest to:

	A) +5 m/s ²	B) +10 m/s ²	C) zero	D) -5 m/s ²	E) –10 m/s ²
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9) The motions of a car and a truck along a straight road are represented by the velocity-time graphs below. The two vehicles are initially alongside each other at time t = 0.



At time T, what is true of the distances traveled by the vehicles since time t = 0?

A) The car will have traveled farther than the truck.

B) The truck will not have moved.

C) The truck will have traveled farther than the car.

D) They will have traveled the same distance.

10) Add 3685 g and 66.8 kg and express your answer in milligrams (mg).

11) A dragster travels 1/4 mi in 6.7 s. Assuming that acceleration is constant and the dragster is initially at rest, what is its velocity when it crosses the finish line?

C) 135 mi/h

D) 269 mi/h

- A) 188 mi/h B) 296 mi/h
- 12) Karim rides his bike with velocity v = (8.4 m/s, 25° north of east) for 10 minutes. How far to the north of his starting position does Karim end up?
 A) 2100 m B) 4600 m C) 36 m D) 76 m
- 13) A rescue plane spots a survivor 132 m directly below and releases an emergency kit with a parachute. If the package descends at a constant vertical acceleration of 6.89 m/s² and the initial plane horizontal speed was 68.9 m/s, how far away from the survivor will it hit the waves?
 A) 2.64 km
 B) 426 m
 C) 446 m
 D) 301 m
- 14) Shown here are the velocity and acceleration vectors for an object in several different types of motion. In which case is the object slowing down and turning to its left?



- 15) A stone is thrown vertically upwards, reaches a highest point, and returns to the ground. When the stone is at the **top** of its path, its acceleration
 - A) is directed downwards.
 - B) changes direction from upwards to downwards.
 - C) is zero.
 - D) is directed upwards.
- 16) What is the maximum distance we can shoot a dart, provided our toy dart gun gives a maximum initial velocity of 2.78 m/s?
 - A) 0.79 m
 - C) 1.58 m

B) 1.39 m D) More information needed



17) A projectile is fired from the origin (at y = 0 m) as shown in the figure. The initial velocity components are $v_{ox} = 940$ m/s and $v_{oy} = 96$ m/s. The projectile reaches maximum height at point P, then it falls and strikes the ground at point Q. In the figure, the y-coordinate of point P is closest to:

 A) 470 m
 B) 90,160 m
 C) 45,080 m
 D) 940 m
 E) 45,550 m

18) The plot below shows the position of an object as a function of time. The letters H-L represent particular moments of time. At which moment in time is the speed of the object equal to zero?



19) A ball is thrown straight upward with a velocity of 39 m/s. How much time passes before the ball strikes the ground? (Disregard air resistance.)

A) 4.0 s

C) 2.4 s B) 1.2 s D) 8.0 s

20) Acceleration is sometimes expressed in multiples of g, where $g = 9.8 \text{ m/s}^2$ is the acceleration due to the earth's gravity. In a car crash, the car's velocity may go from 26 m/s to 0 m/s in 0.15 s. How many g's are experienced, on average, by the driver? C) 13 g A) 22 g B) 18 g D) 23 g

21) Which of the following ideas is true about projectile motion with no air drag?

A) $v \frac{2}{x} + v \frac{2}{y} = \text{constant.}$

B) The velocity of the object is zero at the point of maximum elevation.

C) The horizontal motion is independent of the vertical motion.

D) The acceleration is +g when the object is rising and -g when falling.

E) The trajectory will depend on the object's mass as well as its initial velocity and launch angle.

22) Which of the following situations is impossible?

A) An object has velocity directed east and acceleration directed east.

B) An object has velocity directed east and acceleration directed west.

C) An object has zero velocity but non-zero acceleration.

D) An object has constant non-zero acceleration and changing velocity.

E) An object has constant non-zero velocity and changing acceleration.

23) The following conversion equivalents are given:

1 kg = 1000 g $1 l = 1000 \text{ cm}^3$ $1 l = 0.0353 \text{ ft}^3$ The density of a liquid is 0.83 g/cm^3 . The density of the liquid, in kg/ft³, is closest to: A) 28 B) 21 C) 26 D) 19 E) 24

24) You are taking a turn at 23.0 m/s on a ramp of radius 39.0 m. What is your acceleration?

A) 0.590 m/s^2 B) 13.6 m/s² C) 66.1 m/s² D) 1.70 m/s²

25) A racquetball strikes a v 20 ms. What is the avera	vall with a speed of 30 a	m/s and rebounds to ball during the collis	with a speed of 26 n sion?	n/s. The collision takes
A) 2800 m/s ²	B) 200 m/s ²	C) 1300 m/s ²	D) 1500 m/s ²	E) zero
26) An airplane needs to rea acceleration necessary fo	ach a velocity of 203.0 k or the plane to take flig	xm/h to take off. On ht?	a 2000 m runway, y	what is the minimum
A) 0.95 m/s ²	B) 0.87 m/s ²	C) 0.79	0 m/s^2	D) 1.0 m/s ²
27) The wavelength of a cer nanometers? (1 nm = 10	tain laser is 0.66 micror ^{–9} m)	ns, where 1 micron =	= 1 × 10 ⁻⁶ m. What i	s this wavelength in
A) 6.6 × 10 ¹ nm	B) 6.6 × 10 ⁴ nm	C) 6.6	× 10 ² nm	D) 6.6 × 10 ³ nm
28) A car accelerates from 5 A) 41 m	.0 m/s to 21 m/s at a ra B) 207 m	nte of 3.0 m/s ² . How C) 69 r	v far does it travel w n	hile accelerating? D) 117 m
29) Human reaction times a he hits the brakes than a driver takes 33 s and th	re worsened by alcoho sober driver's car? Ase	l. How much farther sume both cars are in a s to bit the brakes i	r would a drunk dr nitially traveling at	iver's car travel before 49.0 mi/h, the sober
A) 58 ft	B) 53 ft	C) 48 f	t	D) 34 ft
30) A child is sitting on the makes 8.3 rev/min, wha	outer edge of a merry– at is the velocity of the o	go-round that is 18 child in m/s?	m in diameter. If th	e merry-go-round
A) 15.6 m/s	B) 7.8 m/s	C) 1.2	m/s	D) 5.5 m/s
 31) Two bullets are fired sin different initial velocitie A) the fastest one B) the lightest one C) the heaviest one D) the slowest one E) They strike the place 	nultaneously parallel to s. Which one will strike ane at the same time.	o a horizontal plane. e the plane first?	The bullets have di	ifferent masses and
32) You walk 55 m to the no you originally started?	orth, then turn 60° to yc	our right and walk a	nother 45 m. How f	ar are you from where
A) 87 m	B) 94 m	C) 50 r	n	D) 46 m
 33) A ball is thrown vertical velocity and acceleratio A) always in opposit B) always in the same C) first in the same d D) first in opposite d 	lly upward and then co n vectors are te directions. te direction. lirection and then in op irections and then in th	omes back down. Du oposite directions. ne same direction.	ring the ball's fligh	t up and down, its
34) The following conversion $1 \text{ m} = 100 \text{ cm}$ 1 is	on equivalents are given $n = 2.54$ cm 1 ft = 2	n: 12 in		
A bin has a volume of 1 A) 59	.5 m ^{3.} The volume of t B) 41	he bin, in ft ³ , is close C) 47	est to: D) 53	E) 35

35) A person in a car is driving down a straight road. The instantaneous acceleration is decreasing with time, but is directed in the direction of the car's motion. The speed of the car is

A) decreasing with time. B) const	tant. C) increasing	; with time.
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36) Estimate the number of times an average person's heart beats in a lifetime. Assume the average heart rate is 69 beats/min and a life span of 75 yr.

	A) 3 × 10 ⁸ beats	B) 3 × 10 ¹⁰ beats	C) 3 × 10 ⁷ beats	D) 3 × 10 ⁹ beats
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37) A child standing on a bridge throws a rock straight down. The rock leaves the child's hand at t = 0. Which of the graphs shown here best represents the velocity of the stone as a function of time?



38) The plot below shows the position of an object as a function of time. The letters H–L represent particular moments of time. At which moment in time is the speed of the object the highest?



39) A racing car accelerates uniformly from rest along a straight track. This track has markers spaced at equal distances along it from the start, as shown below. The car reaches a speed of 140 km/h as it passes marker 2.



Whereabouts on the track was the car when it was travelling at half this speed, i.e. at 70 km/h?

- A) before marker 1
- B) at marker 1
- C) between marker 1 and marker 2
- 40) Shown here are the velocity and acceleration vectors for an object in several different types of motion. In which case is the object slowing down and turning to its right?



Answer Key Testname: AP CH 1-3 11

1) D 2) B 3) D 4) D 5) B 6) B 7) D 8) E 9) C 10) A 11) D 12) A 13) B 14) B 15) A 16) A 17) A 18) A 19) D 20) B 21) C 22) E 23) E 24) B 25) A 26) C 27) C 28) C 29) C 30) B 31) E 32) A 33) D 34) D 35) C 36) D 37) E 38) A 39) A

40) D