Name: Key Class: _____ Date: _____ ID: A

Semester 1 practice final

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

Measurements

1 The symbols for units of length in order from smallest to largest are
A m, cm, mm, and km.
B mm, m, cm, and km.
C km, mm, cm, and m.
(D) mm, cm, m, and km.

2 The SI base unit for time is
A 1 day.
B 1 hour.
C 1 minute.
(D) 1 second.

3 The most appropriate SI unit for measuring the length of an automobile is the
A centimeter. – ok but cars over 100cm
B kilometer. – too big
(C) meter. best
D millimeter. – too small

4 The most appropriate SI unit for the mass of an automobile is the
A centigram
B Newton ← weight
(C) kilogram
D meter ← distance

5 If some measurements agree closely with each other but differ widely from the actual value, these measurements are
A neither precise nor accurate.
B accurate but not precise.
C acceptable as a new standard of accuracy.
(D) precise but not accurate.

6 These values were obtained as the mass of a bar of metal: 8.83 g; 8.84 g; 8.82 g. The known mass is 10.68 g. The values are
A accurate.
(B) precise.
C both accurate and precise.
D neither accurate nor precise.

7 A vector quantity is a quantity that has both magnitude and direction. Which of the following is not a vector quantity?
A Velocity
(B) Mass – no direction
C Acceleration
D Force

8 A scalar quantity is a quantity that has magnitude, but no direction. Which of the following is not a scalar quantity?
A Time
B Volume
(C) Acceleration
D Speed

9 Which of the following is a physical quantity that has a magnitude but no direction?
A vector
(B) scalar
C resultant
D frame of reference

10 Which of the following is a physical quantity that has both magnitude and direction?
(A) vector
B scalar
C resultant
D frame of reference

Name: _____ ID: A

11 Which of the following is an example of a vector quantity?
(A) velocity = speed with direction
B temperature
C volume
D mass

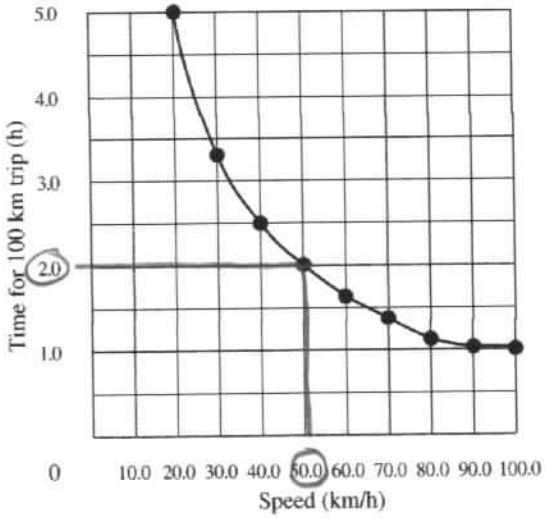
12 Multiplying or dividing vectors by scalars results in ex. $m\vec{a} = \vec{F}$
(A) vectors.
B scalars.
C vectors if multiplied or scalars if divided.
D scalars if multiplied or vectors if divided.

13 Calculate the following, with the correct number of significant figures:
21.4 + 15 + 17.17 + 4.003
A 57.573
B 57.57
C 57.6
(D) 58
round to known place value

21.4XX
15.XXX
17.17X
4.003
57.573
XXX

14 Calculate the following, with the correct number of significant figures:
2 x 3.2
A 6.4
(B) 6
C 5
D 5.2

Multiply & Divide least # of sig fig



15 The time required to make a trip of 100.0 km is measured at various speeds. From the graph above, what speed will allow the trip to be made in 2 hours?
A 20.0 km/h
B 40.0 km/h
(C) 50.0 km/h
D 90.0 km/h

16 The Greek letter *delta*, Δ, indicates a(n)
(A) difference or change.
B sum or total.
C direct proportion.
D inverse proportion.

17 The Greek letter *sigma*, Σ, indicates a(n)
A difference or change.
(B) sum or total.
C direct proportion.
D inverse proportion

18 What is the speed of an object at rest?
(A) 0.0 m/s
B 1.0 m/s
C 9.8 m/s
D 9.81 m/s

Name: _____ ID: A

19 In addition to displacement, which of the following must be used for a more complete description of the average velocity of an object?
A m
B kg
C Δt
D Δx

$v_{ave} = \frac{\text{displacement}}{\Delta \text{time}} = \frac{\Delta x}{\Delta t}$

20 If a person walks 300 meters due south in 10 seconds, what is their displacement?
A 300 m to the south
B 300 m to the north
C 3000 m to the south
D 30 m to the south

no math needed

21 If a person walks 300 meters due south in 10 seconds, what is their average velocity?
A 300 m/s to the south
B 300 m/s to the north
C 3000 m/s to the south
D 30 m/s to the south

$v_{ave} = \frac{300\text{m}}{10\text{s}} = 30\text{m/s}$, South

22 If a person walks one lap around a 500 meters oval track in 10 seconds, what is their average velocity?
A 500 m/s to the south
B 50 m/s to the north
C 0 m/s to the south
D 5000 m/s to the south

start + stop
$\Delta x = 0$ meters

23 A hiker travels south along a straight path for 1.5 h with an average velocity of 0.75 km/h, then travels south for 2.5 h with an average velocity of 0.90 km/h. What is the hiker's displacement for the total trip?
A 1.1 km to the south
B 2.2 km to the south
C 3.4 km to the south
D 6.7 km to the south

$\Delta x_1 = v_a \cdot t$
$= 0.75\frac{\text{km}}{\text{h}} \cdot 1.5\text{h}$
$= 1.125\text{km}$, S

$\Delta x_2 = vt$
$= 0.90\frac{\text{km}}{\text{h}} \cdot 2.5\text{h}$
$= 2.25\text{km}$, S

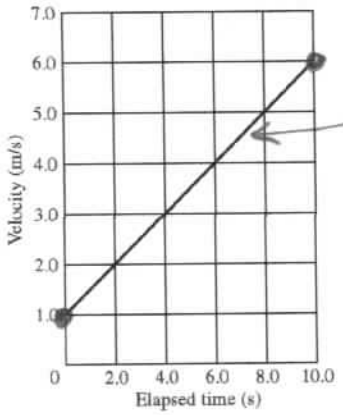
total = 3.375 km
rounded to 2 sig fig

24 Acceleration is
A displacement.
B the rate of change of displacement.
C velocity.
D the rate of change of velocity.

25 When velocity is positive and acceleration is negative, what happens to the object's motion?
A The object slows down.
B The object speeds up.
C Nothing happens to the object.
D The object remains at rest.

oops

26 When velocity is positive and acceleration is negative, what happens to the object's motion?
A The object slows down.
B The object speeds up.
C Nothing happens to the object.
D The object remains at rest.



slope = acceleration

$a = \frac{\Delta v}{\Delta t}$

27 What does the graph above illustrate about acceleration?
A The acceleration is constant. ← slope is constant
B The acceleration is zero. ← flat
C The acceleration decreases. ← slope down
D There is not enough information to answer.

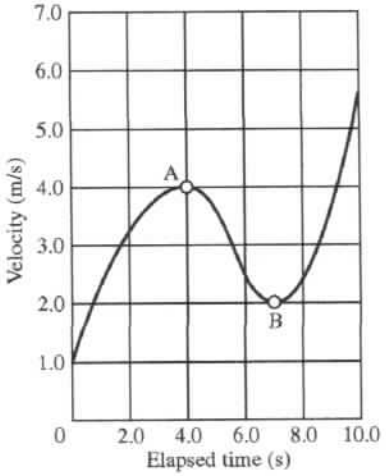
28 What is the acceleration for the above graph?
A 1.0 m/s/s
B 2.0 m/s/s
C 0.5 m/s/s
D There is not enough information to answer.

$a = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i} = \frac{6.0 - 1.0\text{m/s}}{10.0 - 0\text{s}}$

$= \frac{5\text{m/s}}{10\text{s}}$

pick any two points on the graph

$= .5\text{m/s/s}$



29 What does the graph above illustrate about acceleration?
- (A) The acceleration varies.
- B The acceleration is zero. ← flat
- C The acceleration is constant. — constant slope
- D The acceleration increases then becomes constant.

30 From the above graph, what is the average acceleration between points A and B ?
- A 0.5 m/s/s
- B -0.5 m/s/s
- (C) -0.67 m/s/s
- D 1.3 m/s/s
- E 0.67 m/s/s

$a = \frac{\Delta v}{\Delta t}$

$a = \frac{v_B - v_A}{t_B - t_A} = \frac{2.0 m/s - 4.0 m/s}{7s - 4s}$

$= \frac{-2}{3} m/s/s$

31 A race car accelerates from 0 m/s to 30.0 m/s with a displacement of 45.0 m. What is the vehicle's acceleration?
- A 2.00 m/s²
- B 5.00 m/s²
- (C) 10.0 m/s²
- D 15.0 m/s²

$v_f^2 = v_i^2 + 2ad$

$a = \frac{v_f^2 - v_i^2}{2d} = \frac{30^2 - 0^2}{2 \cdot 45}$

32 A sports car accelerates at a constant rate from rest to a speed of 27.8 m/s in 8.00 s. What is the displacement of the sports car in this time interval?
- A 55.0 m
- B 77.0 m
- (C) 111 m
- D 222 m

$v_i = 0$ $v_f = 27.8 m/s$ $t = 8.00 s$ $d = ?$ $a = ?$

$d = v_{ave} \cdot t$

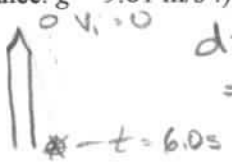
$= \left(\frac{v_f + v_i}{2}\right) t = \left(\frac{27.8 + 0}{2}\right) 8 =$

33 Which of the following units are used to measure free fall?
- A m/s
- (B) m/s² ← acceleration
- C m•s
- D m²/s²

34 Which of the following is a value for the acceleration of objects in free fall (*assume toward earth is negative*)?
- A 9.81 m/s²
- (B) –9.81 m/s²
- C 9.80 m/s²
- D –9.80 m/s²

35 The baseball catcher throws a ball vertically upward and catches it in the same spot as it returns to the mitt. At what point in the ball's path does it experience zero velocity and nonzero acceleration at the same time?
- A midway on the way up
- (B) at the top of its trajectory
- C the instant it leaves the catcher's hand
- D the instant before it arrives in the catcher's mitt

36 A baseball is released at rest from the top of the Washington Monument. It hits the ground after falling for 6.00 s. What was the height from which the ball was dropped? (Disregard air resistance. $g = 9.81$ m/s².)
- A 150.0 m
- (B) 177 m
- C 115 m
- D 210.0 m



$d = v_i t + \frac{1}{2} a t^2$

$= 0 + \frac{1}{2} \cdot 9.81 \frac{m}{s^2} \cdot 6^2$

$=$

37 A coin released at rest from the top of a tower hits the ground after falling 1.5 s. What is the speed of the coin as it hits the ground? (Disregard air resistance. $g = 9.81$ m/s².)
- (A) 15 m/s
- B 21 m/s
- C 31 m/s
- D 39 m/s

$v_i = 0$ $v_f = ?$ $a = g$ $t = 1.5s$

$\Delta v = at$

$v_f - v_i = at$

$v_f = v_i + at$

$= 0 + 9.81 m/s^2 \cdot 1.5 s$

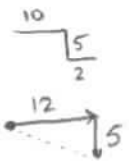
$= 14.7 m/s$

Name: _____ ID: A

38 When there is no air resistance, objects of different masses
(A) fall with equal accelerations with similar displacements.
B fall with different accelerations with different displacements.
C fall with equal accelerations with different displacements.
D fall with different accelerations with similar displacements.

39 For the winter, a duck flies 10.0 m/s due south against a constant wind with a velocity of 2.5 m/s. What is the resultant velocity of the duck?
A 12.5 m/s south
B –12.5 m/s south
(C) 7.5 m/s south
D –7.5 m/s south

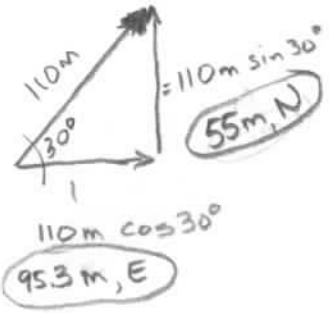
40 A jogger runs 10.0 blocks due east, 5.0 blocks due south, and another 2.0 blocks due east. Assume all blocks are of equal size. What is the jogger's net displacement.
A 14.0 blocks, south of east
B 8.0 blocks, south of east
C 11.0 blocks, south of east
(D) 13.0 blocks, south of east



41 A duck waddles 2.5 m east and 6.0 m north. What are the magnitude and direction of the duck's displacement with respect to its original position?
~~A~~ 3.5 m at 19° north of east
~~B~~ 6.3 m at 67° north of east
(C) 6.5 m at 67° north of east
D 6.5 m at 72° north of east

$a^2 + b^2 = c^2$
$2.5^2 + 6.0^2 = c^2$
$c = 6.5\text{ m}$
$\phi = \tan^{-1}\frac{6\text{m}}{2.5\text{m}} = 67.4^\circ$ N of E

42 An athlete runs 110 m across a level field at an angle of 30.0° north of east. What are the east and north components, respectively, of this displacement?
A 64 m; 190 m
B 190 m; 64 m
C 95 m; 55 m
(D) 55 m; 95 m



43 A piece of chalk is dropped by a teacher walking at a speed of 1.5 m/s. From the teacher's perspective, the chalk appears to fall
(A) straight down.
B in an arch, down and backward.
C in an arch, down and forward.
D straight backward.

44 Which of the following is the cause of an acceleration or a change in an object's motion?
A speed
B inertia
(C) force — net force cause acceleration
D velocity

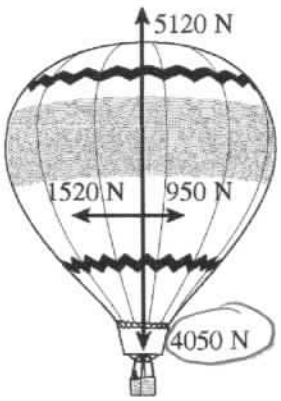
45 Which of the following forces is an example of a contact force?
A gravitational force
B magnetic force
C electric force
(D) frictional force

field forces

46 Which of the following forces is an example of a field force?
(A) gravitational force
B frictional force
C normal force
D tension

Contact forces

Name: _____ ID: A



47 In the free-body diagram shown above, which of the following is the gravitational force acting on the balloon?
A 1520 N
B 950 N
C 4050 N
D 5120 N

48 In the free-body diagram shown above, which direction would the balloon accelerate?
A up and to the right
B up and to the left
C down and to the right
D down and to the left

49 In the free-body diagram shown above, what is the net horizontal force acting on the balloon?
A 1070 N up
B 1070 N down
C 570 N to the left
D 570 N to the right

50 Which of the following is the tendency of an object to maintain its state of motion?
A acceleration
B inertia
C force
D velocity

51 If a nonzero net force is acting on an object, then the object is definitely
A at rest.
B moving with a constant velocity.
C being accelerated.
D losing mass.

52 If a 20. kg object has 10 Newtons of force acting on it to the right and 20 Newtons of force to the left, what is the acceleration of the object?
A 0.50 m/s/s to the left
B 0.50 m/s/s to the right
C 2.0 m/s/s to the left
D 2.0 m/s/s to the right

53 Which statement about the acceleration of an object is correct?
A The acceleration of an object is directly proportional to the net external force acting on the object and inversely proportional to the mass of the object.
B The acceleration of an object is directly proportional to the net external force acting on the object and directly proportional to the mass of the object.
C The acceleration of an object is inversely proportional to the net external force acting on the object and inversely proportional to the mass of the object.
D The acceleration of an object is inversely proportional to the net external force acting on the object and directly proportional to the mass of the object.

54 A small force acting on a human-sized object causes
A a small acceleration.
B no acceleration.
C a large acceleration.
D equilibrium.

Name: _____ ID: A

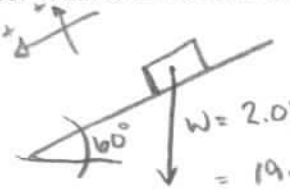
55 A hockey stick hits a puck on the ice. Identify an action-reaction pair, and compare the forces exerted by each object.
- (A) The stick exerts a force on the puck; the puck exerts a force on the stick.
- B The stick exerts a force on the puck; the puck exerts a force on the ice.
- C The puck exerts a force on the stick; the stick exerts a force on the ice.
- D The stick exerts a force on the ice; the ice exerts a force on the puck.

56 The statement by Newton that for every action there is an equal but opposite reaction is which of his laws of motion?
- A first
- B second
- (C) third
- D fourth

$I f ma | =$
1st 2nd 3rd

57 A book with a mass of 2.0 kg is held in equilibrium on a board with a slope of 60.0° by a horizontal force. What is the normal force exerted by the book?
- A 39 N
- B 61 N
- C 15 N
- D 34 N
- (E) 9.8N

oops



$W = 2.0kg \cdot 9.81 m/s^2$
$= 19.6N$
$f_n = W\cos\theta = 19.6N\cos 60°$
$= 9.8N$

58 What is the common formula for work?
- A $W = F_{net}d(\sin\theta)$
- (B) $W = F_{net}d(\cos\theta)$
- C $W = Fd^2$
- D $W = F^2d$

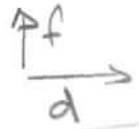
59 Work is done when
- (A) the displacement is not zero.
- B the displacement is zero.
- C the force is zero.
- D the force and displacement are perpendicular.

B, C, D work = 0

60 The more powerful the motor is,
- A the longer the time interval for doing the work is.
- (B) the shorter the time interval for doing the work is.
- C the greater the ability to do the work is.
- D the shorter the workload is.

$P = \frac{W}{t}$

61 A child moving at constant velocity carries a 2 Newton ice-cream cone 1 m across a level surface. What is the net work done on the ice-cream cone?
- (A) 0 J
- B 0.5 J
- C 2 J
- D 20 J



$\cos 90° = 0$
$Work = f_{net}\cos\theta d$
no work when f and d are ⊥

62 Which of the following energy forms is the sum of kinetic energy and all forms of potential energy?
- A total energy
- B sum (Σ) energy
- C nonmechanical energy
- (D) mechanical energy

63 If the only force acting on an object is friction during a given physical process, which of the following assumptions must be made in regard to the object's kinetic energy?
- (A) The kinetic energy decreases.
- B The kinetic energy increases.
- C The kinetic energy remains constant.
- D The kinetic energy decreases and then increases.

friction does work to slow the object

64 What is the kinetic energy of a 0.135 kg baseball thrown at 40.0 m/s?
- A 54.0 J
- B 87.0 J
- (C) 108 J
- D 216 J

$KE = \frac{1}{2}mv^2$
$= \frac{1}{2}\,0.135kg\,(40m/s)^2$
$= 108J$

65 Which of the following energy forms is associated with an object in motion?
A potential energy
B elastic potential energy
C nonmechanical energy
D kinetic energy

66 Which of the following energy forms is associated with an object due to its position?
A potential
B positional
C total
D kinetic

67 The main difference between kinetic energy and potential energy is that
A kinetic energy involves position and potential energy involves motion.
B kinetic energy involves motion and potential energy involves position.
C although both energies involve motion, only kinetic involves position.
D although both energies involve position, only potential involves motion.

68 Which of the following energy forms is associated with an object due to its position relative to Earth?
A potential energy
B elastic potential energy
C gravitational potential energy
D kinetic energy

69 Which of the following energy forms is stored in any compressed or stretched object?
A nonmechanical energy
B elastic potential energy
C gravitational potential energy
D kinetic energy

70 Which of the following equations is NOT an equation for power?
A $P = F\frac{d}{\Delta t}$
B $P = \frac{W}{\Delta t}$
C $P = Fv$
D $P = \frac{Fv}{\Delta t}$

$P = \frac{W}{t} = \frac{f \cdot d}{t}$

$= f \cdot \frac{d}{t} = fv$

71 What is the average power supplied by a 60.0 kg secretary running up a flight of stairs rising vertically 4.0 m in 4.2 s?
A 380 W
B 560 W
C 610 W
D 670 W

$P = \frac{W}{t}$ or $\frac{\Delta PE}{t} = \frac{mgh}{t}$

$= \frac{60\text{kg} \cdot 9.81\frac{\text{m}}{\text{s}^2} \cdot 4\text{m}}{4.2\text{s}}$

72 What is the title of our physics book
A Holt physics
B Pennington Physics
C Newtonian physics
D Physics gone bad

73 A force does work on an object if a component of the force
A is perpendicular to the displacement of the object.
B is parallel to the displacement of the object.
C perpendicular to the displacement of the object moves the object along a path that returns the object to its starting position.
D parallel to the displacement of the object moves the object along a path that returns the object to its starting position.

74 Work is done when
A the displacement is not zero.
B the displacement is zero.
C the force is zero.
D the force and displacement are perpendicular.

repeated oops

75 If the sign of work is negative,
A the displacement is perpendicular to the force.
B the displacement is in the direction opposite the force.
C the displacement is in the same direction as the force.
D no work is done.

76 In which of the following scenarios is work done?
A A weightlifter holds a barbell overhead for 2.5 s.
B A construction worker carries a heavy beam while walking at constant speed along a flat surface.
C A car decelerates while traveling on a flat stretch of road.
D A student holds a spring in a compressed position.

77 In which of the following scenarios is no net work done?
A A car accelerates down a hill.
B A car travels at constant speed on a flat road.
C A car decelerates on a flat road.
D A car decelerates as it travels up a hill.

78 Which of the following energy forms is associated with an object in motion?
A potential energy
B elastic potential energy
C nonmechanical energy
D kinetic energy

79 Which of the following energy forms is associated with an object due to its position?
A potential energy
B positional energy
C total energy
D kinetic energy

80 Ball A has triple the mass and speed of ball B. What is the ratio of the kinetic energy of ball A to ball B.
A 3
B 6
C 9
D 27

81 If friction is the only force acting on an object during a given physical process, which of the following assumptions can be made in regard to the object's kinetic energy?
A The kinetic energy decreases.
B The kinetic energy increases.
C The kinetic energy remains constant.
D The kinetic energy decreases and then increases.

82 What is the potential energy of a 1.0 kg mass 1.0 m above the ground?
A 1.0 J
B 9.8 J
C 10 J
D 96 J

83 Which of the following refers to the sum of kinetic energy and all forms of potential energy?
A total energy
B Σ energy
C nonmechanical energy
D mechanical energy

84 A 3.00 kg toy falls from a height of 1.00 m. What will the kinetic energy of the toy be just before the toy hits the ground? (Assume no air resistance and that $g = 9.81\ m/s^2$.)
A 0.98 J
B 9.8 J
C 29.4 J
D 294 J

Name: _____ ID: A

85 Which of the following is the rate at which energy is transferred?
A potential energy
B kinetic energy
C mechanical energy
(D) power

86 Which of the following is the rate at which work is done?
A potential energy
B kinetic energy
C mechanical energy
(D) power

87 Which of the following are *not* units of power?
A hp
(B) J ← unit of energy
C W
D J/s

88 How much power is required to lift a 2.0 kg mass at a speed of 2.0 m/s?
A 2.0 J
B 4.0 J
C 9.8 J
(D) 39 J

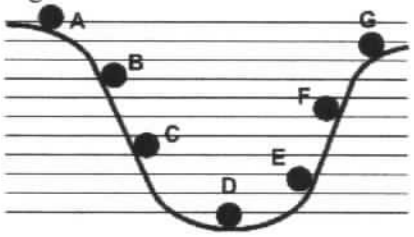
$P = f \cdot v$
$= m \cdot g \cdot v$
$= 2.0\,kg \cdot 9.8\,m/s^2 \cdot 2.0\,m/s$

89 What is the average power supplied by a 60.0 kg person running up a flight of stairs a vertical distance of 4.0 m in 4.2 s?
A 57 W
B 240 W
(C) 560 W
D 670 W

$P = \frac{W}{t} = \frac{\Delta ME}{t} = \frac{\Delta PE}{t}$
$= \frac{mgh}{t} = \frac{60.kg \cdot 9.8\,m/s^2 \cdot 4.0\,m}{4.2\,s}$

90 A more powerful motor can do
A more work in a longer time interval.
(B) the same work in a shorter time interval.
C less work in a longer time interval.
D the same work in a longer time interval.

Figure 1



91 In figure 1, which position does the ball have the most potential energy
(A) A
B B
C C
D D
E G

$PE = mgh$
$PE_{max} = height_{max}$

92 In figure 1, which position does the ball have the most Kinetic energy
A A
B B
C C
(D) D
E G

KE_{max} when PE_{min}

93 In figure 1, which position does the ball have the least Kinetic energy
(A) A
B B
C C
D D
E G

$KE_{min} = PE_{max}$