

Science 10
PRACTICE EXAM
Chemistry and Physics

Name - Key

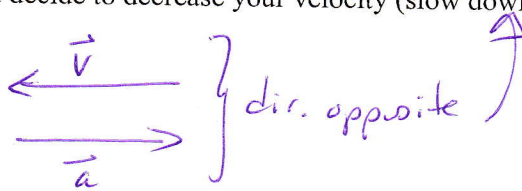
INSTRUCTIONS

1. Write your first and last name on the line provided above.
2. All parts of the practice exam will be completed on this paper.


Part 1 – Multiple Choice (Value - 30)

Circle the letter of the best answer.

-
- X or ÷*
1. The *Certainty Rule* is used to
 - (a) determine the number of significant digits when adding and subtracting measured values
 - (b) determine the number of significant digits when adding and multiplying measured values
 - (c) determine the number of significant digits when subtracting and dividing measured values
 - (d) determine the number of significant digits when multiplying and dividing measured

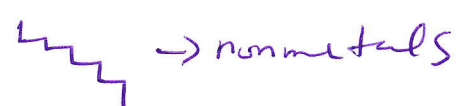
 2. You are riding your bicycle west. If you decide to decrease your velocity (slow down), in what direction is your acceleration?
 - (a) south
 - (b) north
 - (c) east
 - (d) west

dir. opposite

 3. Which list includes only metals?
 - (a) krypton, nitrogen, helium, xenon
 - (b) titanium, zinc, copper, chlorine
 - (c) gold, mercury, boron, iron
 - (d) nickel, platinum, lead, aluminum

metals

 4. Which of the following is electrically neutral? *no charge*
 - (a) electron
 - (b) proton
 - (c) atom
 - (d) ion

 5. A family in the periodic table that contains only nonmetals is the
 - (a) actinides
 - (b) alkali metals
 - (c) lanthanides
 - (d) halogens

nonmetals

 6. Which substance in the following list is an element?
 - (a) NH₃
 - (b) CH₄
 - (c) Bi
 - (d) H₂O

 7. Which statement is not true about matter?
 - (a) Matter can be destroyed.
 - (b) Matter is made up of atoms.
 - (c) Matter takes up space.
 - (d) Matter has mass.

9. Molecular compounds are formed when electrons are

- (a) transferred
- (b) shared
- (c) lost
- (d) gained

10. The measurement 2.030×10^3 km has

- (a) 7 significant digits
- (b) 2 certain digits
- (c) 4 certain digits
- (d) 1 uncertain digit

11. An atom becomes an ion with a charge of -2 when it:

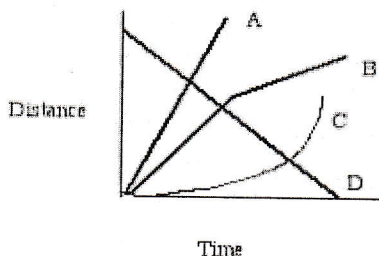
- (a) gains 2 protons
- (b) loses 2 neutrons
- (c) loses 2 electrons
- (d) gains 2 electrons

12. Which of the following is an example of speed?

- (a) 40 km
- (b) 20 km/h[E]
- (c) 1.5 m [right]
- (d) 15 km/h

Magnitude / no direction

13. Which of the following graphs illustrates an object that is speeding up?



- (a) A
- (b) B
- (c) C
- (d) D

14. Which element is a member of the halogens?

- (a) astatine
- (b) copper
- (c) radium
- (d) potassium

15. Protons are

- (a) negatively charged particles found outside the nucleus of an atom.
- (b) neutral particles found in the nucleus of an atom.
- (c) positively charged particles found outside the nucleus of an atom.
- (d) positively charged particles found in the nucleus of an atom.

16. The prefix for 5 is

- (a) tri
- (b) di
- (c) penta
- (d) hexa

17. A beryllium atom has

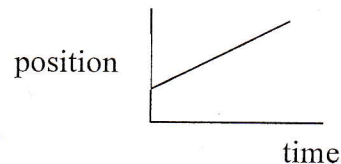
- (a) 4 protons and 6 electrons.
- (b) 4 protons and 2 electrons.
- (c) 4 protons and 8 electrons.
- (d) 4 protons and 4 electrons.

#p⁺ = #e⁻

19. The slope of this position-time graph represents:

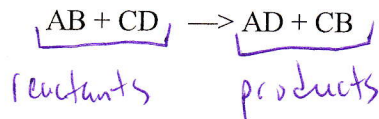
- (a) position
- (b) time
- (c) velocity
- (d) displacement

$$\frac{\text{rise}}{\text{run}} \rightarrow \left[\frac{\text{m}}{\text{s}} \right]$$



20. Identify the products in the reaction below.

- (a) AB and AD
- (b) CD and CB
- (c) AB and CD
- (d) AD and CB

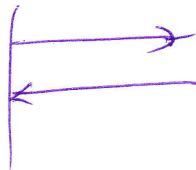


21. An element that forms a diatomic molecule is

- (a) iodine I_2
- (b) sulfur
- (c) phosphorous
- (d) sodium

22. John walks to his friend's house 5 blocks east and then walks 5 blocks west. His displacement is

- (a) 10 blocks
- (b) zero blocks
- (c) 10 blocks [E]
- (d) 10 blocks [W]



23. Physics is the study of

- (a) matter
- (b) energy
- (c) how objects move
- (d) matter and energy

24. If 1 min = 60 s, then 42 s equals

- (a) 12 min
- (b) 0.70 min
- (c) 178 min
- (d) 2520 min

$$42\text{s} \times \frac{1\text{min}}{60\text{s}} = 0.7\text{min}$$

25. The SI base unit of mass is

- (a) kg
- (b) m
- (c) s
- (d) m/s

26. Acceleration can best be defined as

- (a) the speed at which an object is travelling at a particular instant
- (b) the displacement of an object divided by time
- (c) the total distance covered over the total time measured
- (d) the rate of change in velocity

27. In any chemical reaction, the total mass of the reactants is always equal to the total mass of the products. This is known as the law of:

- (a) chemical reactions
- (b) conservation of mass
- (c) constant proportion
- (d) conservation of energy

28. Which chemical formula correctly matches the chemical name provided?

- (a) $\text{Ni}_2(\text{SO}_4)_3$ - nickel (III) sulfate $\text{Ni}^{3+} (\text{SO}_4)^{2-}$

29. A vector quantity has
 (a) direction
 (b) size
 (c) size and direction
 (d) none of the above

Size = magnitude

30. Which of the following is a molecular compound held together by covalent bonds?
 (a) LiBr
 (b) CaO
 (c) H₂O
 (d) Mg₃P₂

Part 2 – Atoms and Ions (Value - 12)

Complete the chart below.

Element Name	Atomic Number	Ion Name	Ion Symbol	# of Electrons in the Ion
radon	86	 	 	
technitium	7# 43	technitium <u>ion</u>	Tc ⁷⁺	36
phosphorous	15	phosphide <u>ion</u>	P ³⁻	18

Part 3 – Compounds (Value - 16)

State whether each compound is ionic or molecular and give the compound name or chemical formula as required.

Ionic

*NaCl
 ↑
 metal*

*molecular H₂O
 ↑
 nonmetal
 * use prefixes when naming*

	Ionic or molecular	Name or Formula
a) CrBr ₃	<u>I</u>	<u>Chromium(III) bromide</u>
b) BeSO ₄	<u>I</u>	<u>beryllium sulfate</u>
c) AlI ₃	<u>I</u>	<u>aluminum iodide</u>
d) FI ₃	<u>M</u>	<u>fluorine triiodide</u>
e) cobalt (III) sulfide	<u>I</u>	<u>Co³⁺S²⁻ → Co₂S₃</u>
f) gallium phosphide	<u>I</u>	<u>Ga³⁺P³⁻ → GaP</u>

a) dinitrogen tetraoxide

M

N₂O₄

Part 4 – Identifying and Balancing Reactions (Value – 10)

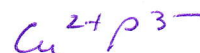
Balance the following equations and state the type of each reaction: formation (F), decomposition (D), single replacement (SR), double replacement (DR), combustion (C) and neutralization (N).

	Type
a) $\underline{\quad}$ CrCl ₂ → $\underline{\quad}$ Cr + $\underline{\quad}$ Cl ₂	<u>D</u>
b) $\underline{2}$ KBr + $\underline{\quad}$ Mg(NO ₃) ₂ → $\underline{2}$ KNO ₃ + $\underline{\quad}$ MgBr ₂	<u>DR</u>
c) $\underline{\quad}$ H₂SO₄ + $\underline{2}$ LiOH → $\underline{\quad}$ Li₂SO₄ + $\underline{2}$ H₂O	<u>N</u>
d) $\underline{4}$ Co + $\underline{3}$ O ₂ → $\underline{2}$ Co ₂ O ₃	<u>F</u>
e) $\underline{\quad}$ Zn + $\underline{\quad}$ Na ₂ SO ₄ → $\underline{2}$ Na + $\underline{\quad}$ ZnSO ₄	<u>SR</u>
f) $\underline{2}$ C ₄ H ₁₀ + $\underline{13}$ O ₂ → $\underline{8}$ CO ₂ + $\underline{10}$ H ₂ O	<u>C</u>

~~Part 5 – Translating Word Equations to Balanced Chemical Equations (Value - 14)~~

Use the following word equations to write balanced chemical equations.

1. Copper metal and phosphorus combine to form copper (II) phosphide.



2. Beryllium hydroxide and potassium nitrate react to form beryllium nitrate and potassium hydroxide.

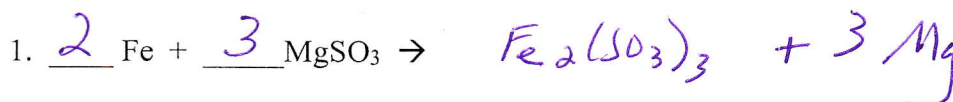


3. Zinc metal and chromium (III) nitrate combine to form zinc nitrate and chromium metal.



~~Part 6 – Predicting Products (Value - 6)~~

Predict the products then write a balanced chemical equations.



Part 7 – Physical Quantities (Value - 9)

Complete the chart below. Choices are provided in some of the headers.

Physical Quantity	Type of Physical Quantity (scalar or vector)	Variable	Unit (s, m, m/s, m/s ²)
constant velocity	vector	\vec{v}	m/s
distance	scalar	d	m
time	scalar	t	s
acceleration	vector	\vec{a}	m/s ²
displacement	vector	$\vec{\Delta d}$	m
average speed	scalar	v_{av}	m/s

Part 8 – Position, Displacement and Velocity (Value - 24)

1. a) Using **C** as your reference point, state the position of each letter below. Include signs to indicate directions: + for a positive direction and – for a negative direction. No units are required in this case. (2)

(i) A $\vec{d} = +5$

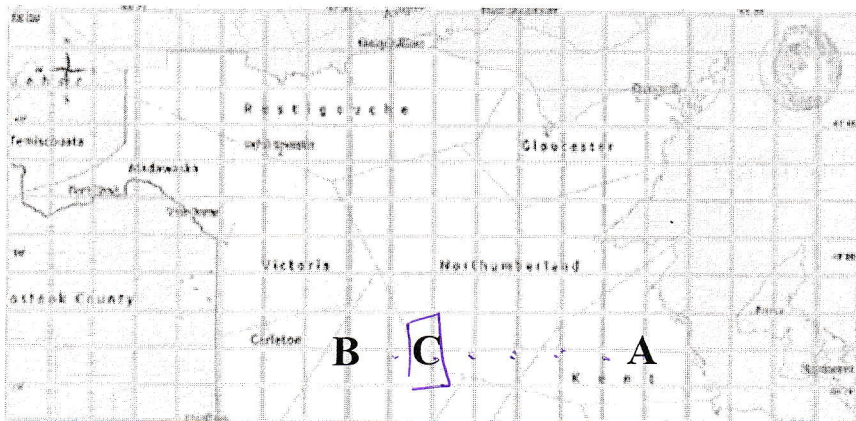
(ii) B $\vec{d} = -2$

b) If an object moves from **B** to **A**, what is the object's displacement? Show a calculation. A word statement is not required. *Consult your formula sheet if needed. (3)

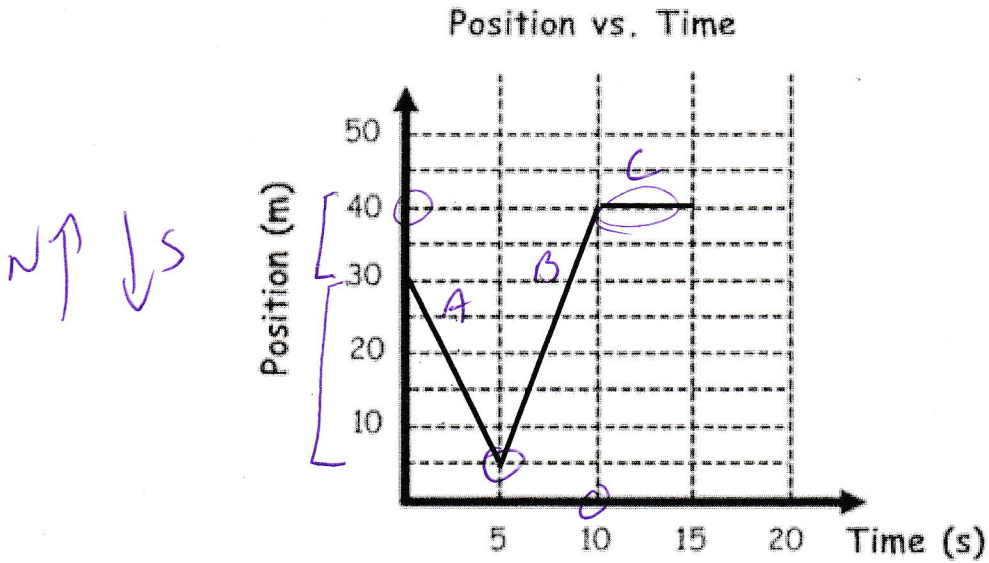
$$\Delta \vec{d} = \vec{d}_f - \vec{d}_i$$

$$\Delta \vec{d} = 5 - (-2)$$

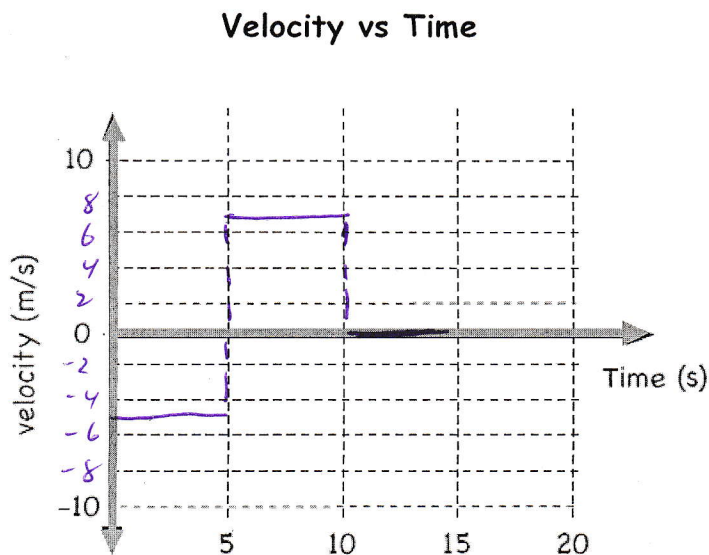
$$\Delta \vec{d} = 7$$



2. Answer the questions below using the position versus time graph provided for an object traveling in a straight line. Assume the positive direction is north.



- a) What is the position of the object at $t = 10$ s? (1)
40 m. north
- b) What was the object doing between $t = 10$ s and $t = 15$ s? (2)
It stopped.
- c) Did the object change directions? If so, when? (1)
 $t = 5$ s
- d) What was the maximum displacement of the object? (1)
25 m, south
- e) What type of motion did the object have between $t = 0$ s and $t = 5$ s? (1)
uniform motion
- f) Draw the velocity-time graph for the object on the grid below. (4)

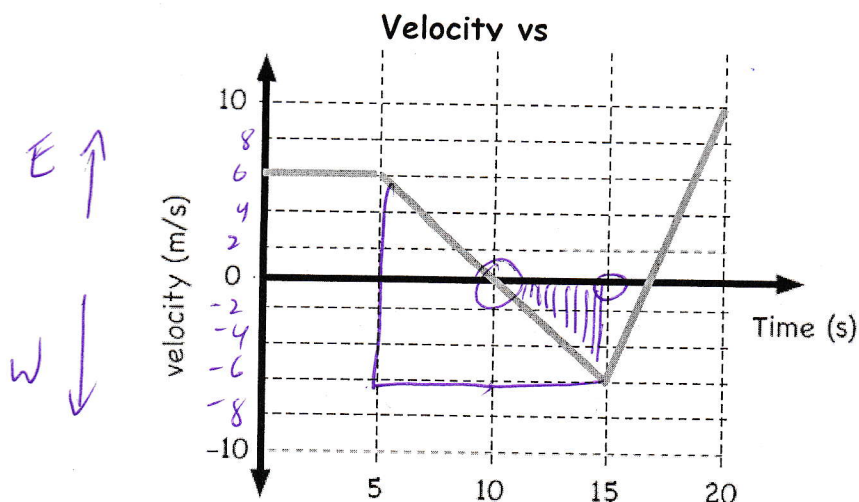


A
 $\frac{25 \text{ m}}{-5 \text{ s}} = -5 \frac{\text{m}}{\text{s}}$

B
 $\frac{35 \text{ m}}{5 \text{ s}} = 7 \frac{\text{m}}{\text{s}}$

C
 $0 \text{ m} = 0 \frac{\text{m}}{\text{s}}$

3. Answer the questions below using the position versus time graph provided for an object traveling in a straight line. Assume the positive direction is east.



a) What is the velocity of the object at $t = 15$ s? (1)

6 m/s, west

b) (i) What type of motion does the object have between $t = 0$ s and $t = 5$ s? (1)

no motion

(ii) What type of motion does the object have between $t = 15$ s and $t = 20$ s? (1)

uniformly accelerated motion

c) What did the object do at $t = 10$ s? (1)

changed direction (E → W)

d) What is the acceleration of the object between $t = 5$ s and $t = 15$ s? Show a calculation and express your answer to 2 SDs. (2)

$$\vec{a} = \frac{12 \text{ m/s}}{10 \text{ s}} = -1.2 \text{ m/s}^2 \text{ or } 1.2 \text{ m/s}^2 \text{ W}$$

e) What was the displacement of the object between $t = 10$ s and $t = 15$ s? Show a calculation and express your answer to 2 SDs. (3)

$$\Delta \vec{d} = \frac{1}{2}bh = \frac{1}{2}(5)(-6) = -15 \text{ m}$$

Part 9 – Word Problems (Value - 36)

Show work for full value. Include a word statement.

1. A hot air balloon flew 12 h at an average speed of 210 km/h. How far did it travel? (6)

$$v_{av} = 210 \text{ km/h}$$

$$d = ?$$

$$t = 12 \text{ h}$$

$$v_{av} = \frac{d}{t}$$

$$d = v_{av} t$$

$$d = \left(\frac{210 \text{ km}}{\text{h}} \right) (12 \text{ h})$$

$$d = 2520 \text{ km}$$

$$d = 2.5 \times 10^3 \text{ km}$$

It traveled
 $2.5 \times 10^3 \text{ km}$.

2. A race car accelerates at 5.0 m/s^2 [W]. What was the initial velocity of the race car if its velocity after 2.7 s was 37 m/s [W]? (7)

$$\vec{a} = -5.0 \text{ m/s}^2$$

$$\vec{v}_i = ?$$

$$\vec{v}_f = -37 \text{ m/s}$$

$$t = 2.7 \text{ s}$$

$$\vec{a} = \frac{\vec{v}_f - \vec{v}_i}{t}$$

$$\vec{a} t = \vec{v}_f - \vec{v}_i$$

$$\vec{v}_i = \vec{v}_f - \vec{a} t$$

$$\vec{v}_i = -37 - (-5.0)(2.7)$$

$$\vec{v}_i = -24 \text{ m/s}$$

$$\vec{v}_f = \vec{v}_i + \vec{a} t$$

$$\vec{v}_i = \vec{v}_f - \vec{a} t$$

The initial velocity was 24 m/s, west.

3. A truck is travelling at 22 m/s east when the driver notices a speed limit sign for the town ahead. If it takes the driver 6.9 s to slow down to a velocity of 14 m/s east, what is the acceleration of the truck? (5)

$$\vec{v}_i = +22 \text{ m/s}$$

$$t = 6.9 \text{ s}$$

$$\vec{v}_f = +14 \text{ m/s}$$

$$\vec{a} = ?$$

$$\vec{a} = \frac{\vec{v}_f - \vec{v}_i}{t}$$

$$\vec{a} = \frac{14 - (22)}{6.9}$$

$$\vec{a} = -1.2 \text{ m/s}^2$$

The acceleration was 1.2 m/s^2 , west.

4. A student travels at a constant velocity of 0.38 m/s [E] . How long did it take the student to travel 3.0 m [E] ? (6)

$$\vec{v} = +0.38 \text{ m/s}$$

$$t = ?$$

$$\Delta \vec{d} = +3.0 \text{ m}$$

$$\vec{v} = \frac{\Delta \vec{d}}{t}$$

$$t = \frac{\Delta \vec{d}}{\vec{v}}$$

$$t = \frac{+3.0 \text{ m}}{+0.38 \text{ m/s}}$$

$$t = 7.9 \text{ s}$$

It took 7.9 s.

5. The peregrine falcon is the fastest of the flying birds. If a peregrine falcon can fly 1.73 km downward in 25 s , what is the average velocity of the bird in km/h ? (6) $1 \text{ h} = 3600 \text{ s}$

$$t = 25 \text{ s} = 0.0069 \text{ h}$$

$$\Delta \vec{d}_f = -1.73 \text{ km}$$

$$\vec{v}_{av} = ?$$

$$\vec{v}_{av} = \frac{\Delta \vec{d}_f}{t}$$

$$\vec{v}_{av} = \frac{-1.73 \text{ km}}{0.0069 \text{ h}}$$

$$\vec{v}_{av} = -2.5 \times 10^2 \frac{\text{km}}{\text{h}}$$

$$25 \text{ s} \times \frac{1 \text{ h}}{3600 \text{ s}} = 0.0069 \text{ h}$$

The average velocity was $2.5 \times 10^2 \frac{\text{km}}{\text{h}}$, down.

6. An object falls from the Transco Tower in Houston and takes 15 seconds to reach the ground. What is its velocity when it hits the ground? (6)

$$\vec{a} = -9.80 \text{ m/s}^2$$

$$t = 15 \text{ s}$$

$$\vec{v}_i = 0 \text{ m/s}$$

$$\vec{v}_f = ?$$

$$\vec{v}_f = \vec{v}_i + \vec{a}t$$

$$\vec{v}_f = (-9.80)(15)$$

$$\vec{v}_f = -1.5 \times 10^2 \text{ m/s}$$

Its velocity was $1.5 \times 10^2 \text{ m/s}$, down.