Key

Science 10 Honours **Final Exam Review**

## Part 1: Numbers

1. Determine the number of sig figs in each of the following:

a. $52.60\ g$ 4
b. $0.0046\ cm$ 2
c. $2\ dogs$ counted
d. $5.002\ mm$ 4
e. $18\ m$ 2
f. $52.0\ h$ 3
g. $1\ molecule$ counted
h. $5 \times 10^2\ L$ 1
i. $3.42 \times 10^6\ s$ 3
j. $9012\ rev.$ 4
k. $0.80\ Hz$ 2
l. $8600\ mL$ 2

2. Write the following number using the indicated number of sig figs: 520813592060

a. 15 sigfigs 520813592060000.
b. 10 sigfigs 520813592 0 $\times 10^{11}$
c. 3 sigfigs $5.21 \times 10^{11}$
d. 1 sigfig $5 \times 10^{11}$

3. Do the following operations using the correct number of sig figs.

a. $362.0 \times 85 =$ 31 000
b. $8.25 \times 10^{-3} \div 16.01 =$ $5.15 \times 10^{-4}$
c. $5.200 \times 10^4 \div 16.80 =$ 3095
d. $15.2 + 9 =$ 24
e. $5.20 + 0.009 =$ 5.21
f. $3.270 \times 10^{-1} + 1.1 \times 10^{-1} =$ 0.44
g. $86.2 + 1.1 \times 10^{-3} =$ 86.2
h. $3.506 \times 100 =$ 400
i. $97 \times 125.62 =$ 12 000
j. $36 \div 6.0 =$ 6.0
k. $925.6 + 180 =$ 1110
l. $5.21 \times 10^3 + 1.3 \times 10^3 =$ 6 500
m. $5.10 \times 10^{-3} + 2.1 \times 10^{-3} =$ 0.007
n. $7.8 \times 10^{-6} - 1 \times 10^{-7} =$ $7.7 \times 10^{-6}$

## Part 2: Chemistry

1. Write the formulas for the following substances:

a. dinitrogen pentoxide $N_2O_5$
b. copper (II) sulphide $Cu_3S_2$
c. chromium (IV) bromide $CrBr_4$
d. copper (I) acetate $Cu(CH_3OO)$
e. beryllium sulphite $BeSO_3$
f. iron (III) hydroxide $Fe(OH)_3$
g. cesium bicarbonate $Cs_2CO_3$
h. carbon monfluoride trichloride $CFCl_3$
i. lithium oxide $Li_2O$
j. oxygen dibromide $OBr_2$
k. magnesium perchlorate $Mg(ClO_4)_2$
l. sodium sulphate $Na_2SO_4$
m. arsenic trichloride $AsCl_3$
n. ammonium dichromate $(NH_4)_2Cr_2O_7$

2. Write the correct name for the following substances:

a. $FCl_3$ Iron(III) Chloride
b. $Ca(CH_3COO)_2$ Calcium Acetate
c. $Li_2Cr_2O_7$ Lithium Dichromate
d. $H_3PO_4$ Phosphoric Acid
e. $MnI_3$ Manganese(III) Iodide
f. $BaSO_4$ Barium Sulphate
g. $LiI$ Lithium Iodide
h. $Sr_3P_2$ Strontium Phosphide
i. $Sc_2(SO_4)_3$ Scandium Sulphate
j. $WO_3$ Tungsten(III) Oxide

3. Define the term "mole".

the amount $6.022 \times 10^{23}$ of anything

4. Determine the molar mass of the following:

a. $CCl_4$ 153.81 g
b. $(NH_4)_2CO_3$ 96.11 g
c. $Ca(CH_3COO)_2$ 158.18 g
d. $Li_2Cr_2O_7$ 229.88 g

5. Determine the mass of $2.42\ mol$ of $BaSO_4$

$$2.42\,mol \times \frac{233.36\,g}{1\,mol} = 565\,g$$

6. Calculate the number of molecules in $1.52 \times 10^{-2}\ g$ of $CH_3OH$

$$1.52 \times 10^{-2}\,g \times \frac{1\ mol}{32.05\ g} \times \frac{6.022 \times 10^{23}\ molec}{1\ mol} = 2.86 \times 10^{20}\ molec$$

7. How many atoms of oxygen are in $5.46 \times 10^{4} mol$ of $CO_2$? $5.46\times10^{4}\ mol\ CO_2 \times \frac{6.022\times10^{23}\ molec}{1\ mol\ CO_2} \times \frac{2\ atoms}{1\ molec} = 6.58\times10^{28}\ atoms$

8. How many hydrogen atoms are in 58.0 $g$ of $LiAlH_4$? $58.0\ g\ LiAlH_4 \times \frac{1\ mol}{37.969} \times \frac{6.022\times10^{23}\ molec}{1\ mol} \times \frac{4\ atoms\ H}{1\ molec} = 3.68\times10^{24}\ atoms$

9. Write a balanced equation for the reaction between lead (II) nitrate and calcium iodide, then determine the mass of each product made if 2.72 $mol$ of lead (II) nitrate reacts with an excess of calcium iodide. $\underset{2.72\ mol}{Pb(NO_3)_2} + CaI_2 \longrightarrow PbI_2 + Ca(NO_3)_2$ — 1250 g — 446 g

10. In the above reaction, calculate the mass of each product if 5.68 $g$ of calcium iodide reacts with an excess of lead (II) nitrate. $PbI_2 \rightarrow 8.91g$ $Ca(NO_3)_2 \rightarrow 3.17g$

11. What mass of $NH_3$ is produced if 4.97 $g$ of $H_2$ reacts with an excess of $N_2$? 28.0g $NH_3$

12. Calculate the mass of each product when 6.28 $g$ of $CaCO_3$ is heated to make $CO_2$ and CaO. 2.76g $CO_2$ 3.52g CaO

13. Determine the mass of each product when 5.62 $g$ of $Ca(CH_3COO)_2$ reacts with 12.42 $g$ of $AgNO_3$. 4.12g $Ca(NO_3)_2$ / 11.9 g $Ag\ CH_3COO$ ← limiting

14. Calculate the mass of each product when 58 $mL$ of 2.42 $M$ $AgNO_3$ reacts with enough $MgI_2$. $AgI_2 = 33.0$ / $Mg(NO_3)_2 = 10.4\ g$

15. Determine the mass of each product when 51 $mL$ of $1.42 \times 10^{-1}$ $M$ $CuNO_3$ reacts with 68 $mL$ of $3.4 \times 10^{-1}$ $M$ $ZnCl_2$. ← limiting
$CuCl = 0.11g$ $Zn(NO_3)_2 = 0.21\ g$

16. Find the mass of each product when 0.52 $g$ of $Na_2CO_3$ reacts with 55 $mL$ of 2.4 $M$ $CaCl_2$. ← limiting
$CaCO_3 = 0.49g$ $NaCl = 0.29\ g$

17. Calculate the percentage composition by mass of each element in $(NH_4)_2SO_4$.
molar mass = 132.16g / N = 21.20% / H = 6.11% / S = 24.26% / O = 48.43%

18. Determine the empirical formula of a substance found to contain 3.86 $g$ of Na, 5.38 $g$ of S, and 10.7 $g$ of oxygen. $Na_2SO_4$

## Part 3: Biology

most cells → Result diploid ↓ ; Result haploid ↓ only sex cells

1. Describe some differences between mitosis and meiosis. ↑ one phase ↑ Two phases

2. Define, using examples, the terms:
genes → Sstt → carries two allele types for gene ← carries one allele per gene
- genotype and phenotype ← physically looks like. ex. - wrinkled pea plant
- homozygous and heterozygous
- haploid and diploid ↑ n ↑ 2n ← number of chromosomes

3. What is the difference between codominance and incomplete dominance? Use examples. Roan cows
Pink flowers from red + white → Incomplete is a blending of both traits and Codominance is both traits expressed at same time.

4. Draw a Punnett square showing the possible offspring from a female with AB blood and a man heterozygous for type A blood.

| ⊗ | $I^A$ | $i$ |
|---|---|---|
| $I^A$ | $I^AI^A$ | $I^Ai$ |
| $I^B$ | $I^AI^B$ | $I^Bi$ |

5. What is a sex-linked trait?
Gene carried on the lower portion of the X chromosome

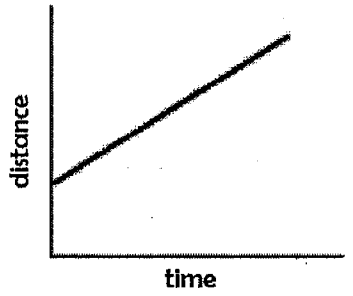
6. Using baldness (an X-linked recessive trait) draw a cross of a female carrier and a normal "haired" male.

| ⊗ | X | Y |
|---|---|---|
| $X^B$ | $X^BX$ | $X^BY$ |
| X | XX | XY |

## Part 4: Physics

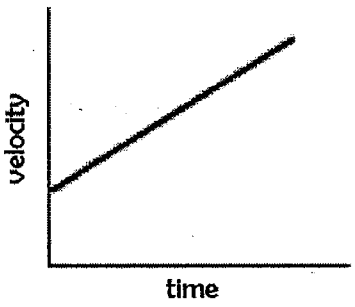
1.) What information can be found from the graphs shown.

a.



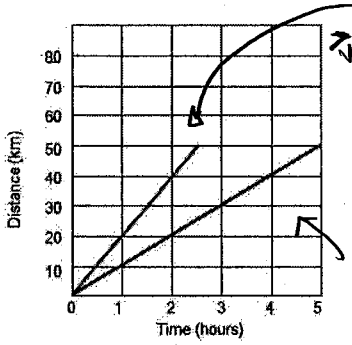

$d =$
$t =$
$\vec{v} =$

b.




$\vec{v} =$
$d =$
$t =$
$a =$

2.)




$\vec{v}_{avg} = +20\frac{m}{s}$

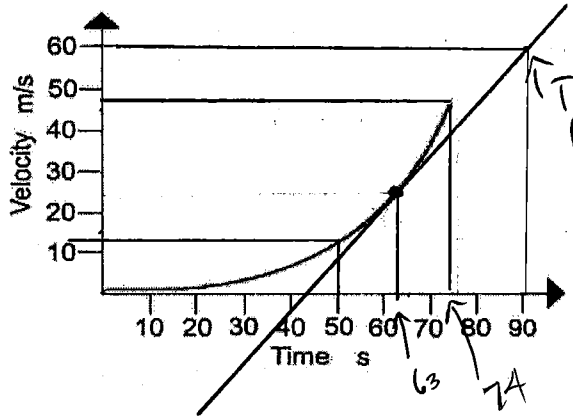
a. What does the straight line indicate?

constant speed

b. Calculate the average velocity for both lines.

$\vec{v}_{avg} = +40\frac{m}{s}$

3.)




a. Determine the acceleration between 0 and 50. $s$.

Tangent

$\vec{a}_{avg} = \frac{\Delta \vec{v}}{\Delta t}$ / $\vec{a}_{avg} = \frac{13-0}{50-0}$ / $\vec{a}_{avg} = +0.26\frac{m}{s^2}$

b. Determine the acceleration at 63 $s$.

$\frac{60}{91} = +0.67\frac{m}{s^2}$

c. What is the average acceleration for the trip?

$\vec{a}_{avg} = \frac{\Delta \vec{v}}{\Delta t}$ / $\vec{a}_{avg} = \frac{47-0}{74-0}$ / $\vec{a}_{avg} = +0.64\frac{m}{s^2}$

4.) Determine the velocity of a rock just prior to impact if it is dropped from a height of 165 $m$.

$E_p + E_k = E_p' + E_k'$ / $mgh = \frac{1}{2}mv^2$ / $gh = \frac{1}{2}v^2$ / $(9.81)(165) = 0.5v^2$ / $\vec{v} = -56.9\frac{m}{s}$

5.) Calculate the final velocity of a car that goes from $+23\frac{m}{s}$ to a new velocity in 25 $s$ if the rate of acceleration is $+0.20\frac{m}{s^2}$.

$\vec{v}_F = \vec{v}_0 + \vec{a}t$ / $\vec{v}_F = (+23) + (+0.20)(25)$ / $\vec{v}_F = +28\frac{m}{s}$

6.) Calculate the force of gravity on a 15 $kg$ rock on the Earth's surface.

$\vec{F}_g = mg$ / $\vec{F}_g = 15 \times 9.81$ / $F_g = -150$ N

7.) Calculate the force of gravity between two 10. $kg$ masses if their masses are 15 $m$ apart.

$F_g = \frac{Gm_1m_2}{r^2}$ / $\vec{F}_g = \frac{(6.67\times10^{-11})(10)(10)}{15^2}$ / $\vec{F}_g = 3.0\times10^{-11}$ N towards each other

8.) Calculate the momentum of a 2.5 $kg$ object falling at $5.0\frac{m}{s}$.

$\vec{p} = m\vec{v}$ / $\vec{p} = (2.5)(-5.0)$ / $\vec{p} = -12.5\ kg\cdot\frac{m}{s}$

9.) What is the momentum of a 2.5 $kg$ bowling ball traveling at $+2.5\frac{m}{s}$ if it hits a 1.5 $kg$ mass and they both move off together?

$\vec{p}_1 + \vec{p}_2 = \vec{p}_1' + \vec{p}_2'$ / $m\vec{v}_1 + 0 = m_{1+2}\vec{v}'$ / $(2.5)(+1.5) = p'$ / $p' = 0.94\ kg\cdot\frac{m}{s}$

10.) A force of $2.65 \times 10^4$ $N$ is needed to bring a car moving at $+48.0\frac{m}{s}$ to a halt in 31.0 $s$.

What is the mass of the car?

(1.) $\vec{v}_F = \vec{v}_0 + \vec{a}t$ / $0 = +48.0 + \vec{a}(31.0)$ / $\vec{a} = -1.548\frac{m}{s^2}$ / (2.) $\vec{F} = m\vec{a}$ / $-2.65\times10^4 = m(-1.548)$ / $m = 1.71\times10^4\ kg$

11.) An object is thrown from the ground into the air at an angle of 35° from the horizontal at a velocity of $+21.0\frac{m}{s}$. How far will the object travel horizontally?

$d_x = 42\ m$

12.) An object uniformly accelerates at a rate of $+2.00\frac{m}{s^2}$. While accelerating at this rate, the object is displaced $1524.6\ m$ in a time of $35.0\ s$. What velocity did this object reach in this time?

$v_F^2 = v_0^2 + 2\vec{a}\vec{d}$ / $\vec{v}_F^{\,2} = 0^2 + 2(+2.00)(1524.6)$ / $\vec{v}_F = +78.1\ \frac{m}{s}$

13.) An object accelerates uniformly from rest for $9.2\ s$. If in this time the displacement of the object is $25.4\ m$, what is the acceleration?

$\vec{d} = \vec{v}_0 t + \frac{1}{2}\vec{a}t^2$ / $+25.4 = 0.5(\vec{a})(9.2)^2$ / $\vec{a} = +0.60\ \frac{m}{s^2}$

14.) An object accelerates uniformly from rest. If it travels $31.0\ m$ and reaches a velocity of $+22.0\frac{m}{s}$, how long was the object accelerating?

$\vec{d} = \frac{1}{2}(v_F + v_0)t$ / $+31.0 = 0.5(22+0)t$ / $t = 2.82\ s$

15.) An object initially at rest is uniformly accelerated to a velocity of $+12.6\frac{m}{s}$ in $3.60\ s$. If during this time the displacement of the object was $21.5\ m$, what was the rate of acceleration?

$v_F^2 = v_0^2 + 2\vec{a}\vec{d}$ / $(+12.6)^2 = 0^2 + 2(\vec{a})(21.5)$ / $\vec{a} = +3.69\ \frac{m}{s^2}$

16.) An object initially traveling at a velocity of $1.7\frac{m}{s}$ accelerates uniformly at a rate of $+2.5\frac{m}{s^2}$. During this time of acceleration, the displacement of the object is $27\ m$. Find the final velocity. $\vec{v}_F^{\,2} = v_0^2 + 2\vec{a}\vec{d}$ / $\vec{v}_F^{\,2} = (+1.7)^2 + 2(+2.5)(+27)$

$\vec{v}_F = 11.74\ \frac{m}{s} \rightarrow \vec{v}_F = 12\ \frac{m}{s}$

17.) A rabbit is thrown horizontally from the top of a cliff at a velocity of $+25.0\frac{m}{s}$. If the rabbit takes $3.40\ s$ to reach the ground, how far from the base of the cliff did the rabbit hit the ground?

$\vec{d}_x = \vec{v}_x t$ / $d_x = (+25.0)(3.40)$ / $\vec{d}_x = +85\ m$

18.) While accelerating uniformly from rest, an object is displaced $15.5\ m$ in $8.15\ s$. What is the velocity at this time? $\vec{d} = \frac{1}{2}(\vec{v}_F + \vec{v}_0)t$ / $+15.5 = (0.5)(\vec{v}_F + 0)(8.15)$

$\vec{v}_F = +3.80\ m/s$

19.) Calculate the kinetic energy of a boulder weighing $50.0\ N$ perched on the edge of a cliff $25.0\ m$ high.

0 J (No movement = No Kinetic)

20.) A model airplane of mass $1.5\ kg$ moves with a speed of $3.0\frac{m}{s}$, $5.0\ m$ above the ground. Calculate the potential energy of the plane.

$E_p = mgh$ / $E_p = (1.5)(9.81)(5.0)$ / $E_p = 74\ J$