1. Calculate the average rate of change for the tables above including the units. What does the rate of change represent for each table?

a)

Hours worked (x)	Earnings ($) ($y$)
4 x_1	32 y_1
20 x_2	160 y_2

$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{160-32}{20-4}$

$= \frac{128}{16}$

$= \$8/1h$

∴ Every hour worked, $8 earned

b)

Pages printed	Cost ($)
1000	56
5000	145

$= \frac{145-56}{5000-1000}$

$= \frac{89}{4000}$

$= \$0.02225/\text{page}$

∴ cost per page

c)

Distance driven (km)	Fuel used (L)
45	3
60	12

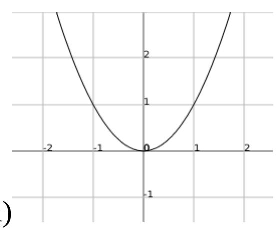
$= \frac{12-3}{60-45}$

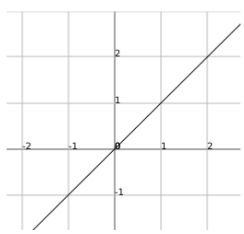
$= \frac{9}{15}$

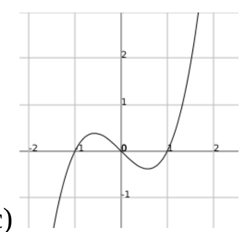
$= 0.60\ L/km$

gas consumption per km driven

2. Identify each graph as <u>linear,</u> <u>quadratic</u> or <u>none</u>. Write your answer in the lines to the right.


a)


b)


c)

TYPE OF RELATION:

a) ___Q___

b) ___L___

c) ___N___

3. Calculate the 1st differences:

x	$y = 3x$
-1	$3(-1) = -3$
0	$3(0) = 0$
1	3
2	6
3	9

$0-(-3) = 3$
$3-0 = 3$
$6-3 = 3$
$9-6 = 3$

b) Calculate the 2nd differences:

x	$y = x^2$
-1	$(-1)^2 = 1$
0	$(0)^2 = 0$
1	1
2	4
3	9

$0-1 = -1$
$1-0 = 1$
$4-1 = 3$
$9-4 = 5$

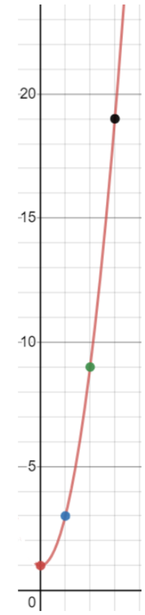
2
2
2

c) Calculate the growth/decay factor:

x	$y = 3^x$
-1	$3^{-1} = 1/3$
0	$3^0 = 1$
1	$3^1 = 3$
2	$3^2 = 9$
3	$3^3 = 27$

$1 \div 1/3 = 3$
$3 \div 1 = 3$
$9 \div 3 = 3$
$27 \div 9 = 3$

4. Determine if the graph shown represents a quadratic relation or exponential. Show/explain how you got your answer.



x	y	1st diff.	2nd diff.
0	1		
		2	
1	3		4
		6	
2	9		4
		10	
3	19		

$\therefore$ It's quadratic b/c 2^{nd} differences are constant.

5. Identify each formula below as linear, quadratic or exponential.

y = 2x + 1	L ($y = mx + b$)
y = x^2 + 2x + 1	Q ($y = Ax^2 + Bx + c$)
y = 2^x	E ($y = a \cdot b^x$)
y = $20(3)^x$	E
y = x	L

1

6. Simplify each expression using the exponent rules (express each as a power with positive exponents).

$\frac{(3^{-2})(3^{3})}{3^{-1}} = \frac{3^{-2+3}}{3^{-1}}$ $= \frac{3^1}{3^1}$ $= 3^{1-(-1)}$ $= 3^2$	$(u^2v^0w^{-1})^{-2}$ $= (u^2)^{-2}(w^{-1})^{-2}$ $= u^{-4}w^2$ $= \frac{w^2}{u^4}$	$\frac{15p^4q^3}{5p^{-3}q} = \frac{15}{5} \cdot \frac{p^4}{p^{-3}} \cdot \frac{q^3}{q}$ $= 3 \cdot p^{4-(-3)} \cdot q^{3-(1)}$ $= 3p^7q^2$

7. Evaluate each and leave in fraction form

$125^{\frac{2}{3}}$ $= (5^3)^{2/3}$ $= 5^{3 \cdot \frac{2}{3}}$ $= 5^2 \rightarrow 25$ 125 | 5 25 | 5 5 | 5 1	$(256)^{\frac{3}{4}}$ $= (4^4)^{3/4}$ $= 4^{4 \cdot \frac{3}{4}}$ $= 4^3$ $= 64$ 256 | 4 64 | 4 16 | 4 4 | 4 1	$(32)^{-\frac{2}{5}}$ $= (2^5)^{-2/5}$ $= 2^{5 \cdot \frac{-2}{5}}$ $= 2^{-2}$ $= 1/4$ 32 | 2 16 | 2 8 | 2 4 | 2 2 | 2 1

8. Solve for x

$4x^3 = 32$ $\frac{4x^3}{4} = \frac{32}{4}$ $\sqrt[3]{x^3} = \sqrt[3]{8}$ $\boxed{x = 2}$	$2^{3x} = 64$ convert by into exponent $\cancel{2}^{3x} = \cancel{2}^{6}$ $\frac{3x}{3} = \frac{6}{3}$ $\boxed{x = 2}$ 64 | 2 32 | 2 16 | 2 8 | 2 4 | 2 2 | 2 1	$4^{x-3} = 8^{x+1}$ Convert each base to 2 $(2^2)^{(x-3)} = (2^3)^{(x+1)}$ $\cancel{2}^{2(x-3)} = \cancel{2}^{3(x+1)}$ $2(x-3) = 3(x+1)$ $2x - 6 = 3x + 3$ $\boxed{-9 = x}$

9. The following formula shows the relationship between A and B.

$$A = \frac{2(B+30)}{3}$$

a) Calculate B when A is 90

$3 \times 90 = \frac{2(B+30)}{3} \times 3$ multiply BS by 3 to cancel out ÷ on RS

$\frac{270}{2} = \frac{2(B+30)}{2}$ divide BS by 2 to cancel out x on RS

$135 = B + 30$
$-30 \quad\quad -30$

$105 = B$

$\boxed{\therefore B = 105}$

b) Rearrange the formula to solve for B

$3 \cdot A = \frac{2(B+30)}{3} \cdot 3$ Step1: Multiply BS by 3

$\frac{3A}{2} = \frac{2(B+30)}{2}$ Step2: Divide BS by 2

$\frac{3A}{2} = B + 30$ Step3: Subtract 30 from BS
$-30 \quad\quad -30$

$\boxed{B = \frac{3A}{2} - 30}$

10. The volume of a sphere is given by the formula $V = \frac{4}{3}\pi r^3$. Solve for r.

$3 \cdot V = \frac{4}{3}\pi r^3 \cdot 3$ Step1: Multiply BS by 3

$\frac{3V}{4\pi} = \frac{4\pi r^3}{4\pi}$ Step2: Divide BS by 4π

$\sqrt[3]{\frac{3V}{4\pi}} = \sqrt[3]{r^3}$ Step3: Cube root BS

$\therefore r = \sqrt[3]{\frac{3V}{4\pi}}$

COMPLETE: p.332 #1, 3, 4, 9, 14 + p.323 #1-3 and p.400 #1, 8, 9, 11, 13, 15, 16, 18b and 19cf