Mathematics Department

Fred

Course: A1MAA

JOHN TONKIN COLLEGE

Topic Title: Test 2 - Algebra, Earning Money & Simple/Compound Interest

Student Name: Answers

Date: _____

Special Instructions: **Calculator Allowed**

Formulae Sheet and 1 A4 page of notes allowed.

Show all working.

Time Allowed: 65 minutes

Marks: / 65

Question 1 **[1, 1, 1: 3 marks]**

To estimate blood alcohol content (*BAC*) two formulae are provided; one for males (BAC_m) and one for females (BAC_f).

$$BAC_m = \frac{10n - 7.5h}{6.8m} \quad \text{AND} \quad BAC_f = \frac{10n - 7.5h}{5.5m}$$

where n is the number of standard drinks consumed, h is the number of hours since drinking alcohol and m is the person's mass in kilograms.

Bradley is 65 kg. He has had four standard drinks and it is three hours since his last drink.

(a) Show the substitution required to estimate Bradley's *BAC*.

$BAC_m = \frac{10\times4 - 7.5\times3}{6.8\times65}$ ✓

(b) Use your substitution from part (a)(i) to estimate Bradley's *BAC*.

$= \frac{17.5}{442} = 0.0395\ldots$ ✓ ≈ 0.04

∴ Bradley's BAC is ≈ 0.04

(c) If the legal blood alcohol limit is 0.05 for full license holders operating motor vehicles, would Bradley pass OR fail the test?

Pass ✓

Question 2 **[2, 2, 3: 7 marks]**

(a) For a loan of $100 000, interest is charged at an annual rate of 4.8% using a simple interest calculation. If the loan is taken out over 7 years, how much interest would be charged?

$$I = \frac{PRT}{100}$$

$$= \frac{100000 \times 4.8 \times 7}{100}$$

$$= \$33600$$ ✓

∴ $33600 would be charged ✓

(b) How much interest would be charged on a loan of $100 000, if interest is charged at an annual rate of 4.8% compounding annually over 7 years?

4.8% = 0.048

$$F_v = P_v(1+r)^t$$

$$= 100\,000(1+0.048)^7$$ ✓

$$= 138844.60$$

∴ Interest charged would be ✓

138844.60 − 100 000

= $38844.60

* or other acceptable calculation

(c) Calculate the interest charged on a loan of $100 000 if interest is charged at a rate of 4.8% pa compounded quarterly over 7 years?

4 quarters/year × 7 yrs

= 28 quarters ✓

$$F_v = P_v\left(1+\frac{r}{n}\right)^t$$

$$= 100000(1+0.048\div 4)^{28}$$ ✓

$$= 139654.31$$

∴ Interest charged would be

139654.31 − 100 000 ✓

= $39654.31

* or other acceptable calculation

Question 3 **[2: 2 marks]**

When Tahlia received the annual report for her share portfolio, she noticed that the estimate for her percentage dividend was 8.2%. For a portfolio worth $543 820, how much was her dividend estimate?

8.2% × $543 820

= 0.082 × 543820 ✓

= $44 593.24

Dividend estimate = $44593.24 ✓

Question 4 **[4: 4 marks]**

Toys R'US that has 12.5million shares make an after tax profit of $28.7 million. Of their annual profit the directors decide to pay a dividend of 28% of the total profit. Calculate the dividend paid per share.

28% of 28.7 million

0.28 × 28700000 ✓

= $8036000

$$\text{Dividend/share} = \frac{\text{\% profit paid}}{\text{no. of shares}}$$

$$= \frac{8036000}{12500000} \checkmark$$

= $0.64 ✓

∴ Dividend/share = 64c ✓

Question 5 **[4: 4 marks]**

The table below shows the declared dividends of three companies.

Company	Share Price	Dividend
ROG Ltd	$ 6.40	71 c
DFV	$ 8.85	93 c
Gordon & Sons	$ 7.10	85 c

Compare the dividend yields of three companies to determine the best yielding stocks.

ROG Ltd DY = $\frac{\text{Div/share}}{\text{Market price}}$

= $\frac{0.71}{6.40} \times 100$ ✓

= 11.09%

DFV DY = $\frac{\text{Div/share}}{\text{Market price}}$ ✓

= $\frac{0.93}{8.85} \times 100$

= 10.51%

Gordon & Sons DY = $\frac{\text{Div/share}}{\text{Market price}}$

= $\frac{0.85}{7.10}$ ✓

= 11.97%

∴ Best yielding stock is Gordon & Sons @ 11.97% ✓

Question 6 **[1, 1, 1, 1, 1, 2: 7 marks]**

The table below the next sheet shows part of a spreadsheet John Deer uses to calculate his employees' weekly pay. In this spreadsheet

- The rows are numbered 1 to 6 and the columns labelled A to F.
- The symbols used to represent mathematical operations are + (add), - (subtract), * (multiply), / (divide) and ^ (to the power of)
- The order of operations can be controlled by brackets.

Tax is paid on the income minus deductions.

	A	B	C	D	E	F
1	Employee	Number of hours worked	Hourly rate	Weekly Income	Deductions	Take-home pay
2	Jim	38	$18.75	$ 712.50	$50	$662.50
3	Jen	25	$24.00	600.00	$42	$558.00
4	Tony	40	$25.60	1024.00	$63	$961.00
5	Pam	35	$30.00	$1050	$65	$985.00
6					TOTAL	$3166.50

(a) Describe the data stored in cell B4.

Tony's hrs worked ✓

(b) i. In which cell is Jim's hourly rate?

C2 ✓

ii. Calculate his hourly rate

712.50 ÷ 38
= $18.75 ✓
∴ Jim's hrs rate would be $18.75

(c) To calculate the values to store in D3 the formula used is D3=B3*C3.

i. What value will be stored in D3?

$600 ✓

ii. Complete cell D4

$1024 ✓

(d) Complete the values for the rest of the table; write a formula to compute the value for F6.

= Sum(F2 : F5) or acceptable correct formula ✓

Question 7 **[1, 1, 3: 5 marks]**

If Tina earns an annual salary of $54 600:

(a) What would her weekly salary be?

54 600 ÷ 52
= $1050
Her weekly salary = $1050 ✓

(b) Given that she works 35 hours per week, what would her hourly rate be?

$1050 ÷ 35
= $30
Hrly rate is $30 ✓

(c) If Tina receives the following allowances,

- Height Allowance set at $5.50 per hour
- Meal Allowance set at $16.50 per day for 5 days work/week
- Site Allowance set at $115.30 per week

calculate her weekly wage.

HA = 5.50 × 35 = $192.50
MA = 16.50 × 5 = $82.50
SA = 115.30 × 1 = $115.30 ✓
$390.30

Weekly wage = $1050 + $390.30 ✓
= $1440.30 ✓

Question 8 **[2, 3, 3: 8 marks]**

A young person qualifies for youth allowance of $272.80 per fortnight, so long as they do not earn more than $415 before tax in that time.
In any fortnight that they do earn more than $415, their allowance will be reduced by 50 cents in the dollar for earnings over $415 and up to $498, reduced by 60 cents in the dollar for earnings over $498.

(a) Sam has a part-time job for eight hours every Saturday and six hours every Sunday that pays $22.25 per hour.
(i) Calculate her fortnightly earnings.

22.25 × (8+6) = $311.50 ✓
∴ $311.50 × 2
= $623.00 ✓

(ii) Calculate her fortnightly youth allowance. Justify your answer.

(i) 623 − 415 = $208 ✓ ∴ 0.5 × 83 = $41.50

0.6 × 125 = $75.00

Youth Allowance = 272.80 − (41.50 + 75.00) ✓

= 272.80 − (116.50) ✓

= $156.30

(b) Sam has been offered an extra six hours work on a Friday but a friend has told her that she will not qualify for youth allowance if she takes these additional hours. Show that her friend is correct.

Sam's earnings would now be 6 × 22.25 × 2 ✓

= $267 more a fn

0.6 × 392 = 235.20

∴ $890

Youth Allowance = 272.80 − (41.50 + 235.20) ✓

= −$3.90 ✓

∴ Friend correct.

Question 9 **[8, 1: 9 marks]**

Rosie receives a student allowance of $430 from the government each fortnight. She also receives a weekly income of $180 from paid work.

Rosie's fixed weekly costs are:

Rent $100 per week
Bus fares $40 per fortnight
Insurances $450 per annum
Electricity $180 per quarter
Food $320 per month
Entertainment $1300 every 6 months

(a) Set up a weekly budget for Rosie using the given data into a table. (rounding to the nearest dollar)

Income per week		Expenditure per week	
Paid work	$180 ✓	RENT	$100.00 ✓
Student All.	$215 ✓	BUS FARE	$ 20.00 ✓
		INSURANCE	$ 9.00 ✓
		ELECTRICITY	$ 14.00 ✓
		ENTERTAINMENT	$ 50.00 ✓
		FOOD	$ 74.00 ✓
		SAVINGS	$ 128.00
TOTAL	$ 395	TOTAL	$ 395 ✓

(b) Given there were no other expenses, how much did Rosie save for the week?

$128 ✓

Question 10 **[4, 3, 3: 10 marks]**

John wants to see which of the two banks in his portfolio of shares is the better performer, and he decides to use the P/E ratio to compare the two banks.

$$\text{P/E ratio} = \frac{\text{Market price per share}}{\text{Annual earnings per share}}$$

ANZ Bank's shares are currently $33.65 while Westpac's shares are currently $32.055.
ANZ Bank has annual earnings of 207.5 cents per share.
Westpac has annual earnings of 223.1 cents per share.

a) Calculate the P/E ratio for each bank and make a recommendation as to which bank John should buy more of, if the P/E ratio was the only indicator to be used.
Justify your recommendation.

ANZ P/E ratio = $\frac{33.65}{2.075}$ ✓ Westpac P/E ratio = $\frac{32.055}{2.231}$ ✓

= 16.22 =14.37 ✓

P/E ratio for Westpac is 14.37. This is lower for Westpac than ANZ i.e.w. for every dollar of current earnings the investor is paying less to invest in Westpac. ✓

Dividends from both banks are paid twice a year and in the last year ANZ Bank gave dividends at 82c and 84c per share.

b) What percentage of its annual earnings does ANZ Bank distribute to shareholders?

84 + 82 = 166c ✓

∴ 166 ÷ 207.5 X100 = 80% ✓

c) Westpac paid an interim dividend of 66c per share. It has a policy of paying 65% of its annual earnings as dividends. What would you expect its final dividend payout to be?

• $\frac{x}{223.1} \times 100 = 65\%$ ✓

∴ $x = 145c$ ✓

• ∴ 145 − 66

∴ Final dividend is 79c ✓

Question 11 **[3: 3 marks]**

A real estate salesman is paid commission of 1.2% of the value of all properties sold. He sells two houses, one for $455 000 and another for $762 000. Calculate the total commission the agent will receive.

$455\,000 + 762\,000$

$= 1217000$ ✓

Commission of 1.2% $= 0.012 \times 1217000$ ✓

$= \$14\,604$ ✓

Question 12 **[3: 3 marks]**

Larry buys 2000 shares at $3.00 a share. If the stockbroker charges a 0.75% brokerage fee, what will be the total cost of Larry's investment?

$2000 \times 3 = \$6000 \times 0.75\%$ ✓

$\therefore 0.0075 \times 6000$

$= \$45$ ✓

Total cost of Larry's investment is

$\$6000 + \$45$ ✓

$= \$6045.00$