Financial Mathematics (30 marks))

For all calculations, use 1 year = 52 weeks.

1. Yasmin is paid $1048 for a normal 40 hour week.

a) What is her hourly wage?

$1048 \div 40 = \$26.20$

b) How much would she be paid in a week where she works 35 hours normal time and 8 hours time and a half? **2**

Pay $= 35 \times 26.2 + 8 \times 1.5 \times 26.2$
$= 917 + 314.4$
$= \$1231.40$

Deduct 1 mark here for 1231.4

2. Tom is paid a salary of $3820 per month.

a) What is his yearly salary?

$3820 \times 12 = \$45840$

b) Andy has a job paying $1900 per fortnight. How much more or less does he earn per week than Tom? **2**

Andy $1900 \div 2 = \$950$ /week
Tom $45840 \div 52 = \$881.54$

$950 - 881.54 = 68.46$

Andy earns $68.46 more per week

1 mark for $3820 \div 4$

3. Yang receives 17.5% of 4 weeks normal pay as leave loading. If she earns $1660 per week, what is her total holiday pay? **2**

$1660 \times 1.175 \times 4$
$= \$7802$

OR Normal pay $= 1660 \times 4$
$= \$6640$

Loading $= 6640 \times 0.175$
$= \$1162$

Total pay $= 6640 + 1162$
$= \$7802$

4. Cameron's gross pay is $2196 per fortnight. His deductions are PAYG of $434, union fees of $22.20, health insurance of $87.50 and voluntary superannuation of $100.

a) Calculate Cameron's net pay.

$2196 - 434 - 22.2 - 87.5 - 100$
$= \$1552.30$

b) What are Cameron's deductions as a percentage of his gross pay? Answer to 1 decimal place.

Deductions $= 434 + 22.2 + 87.5 + 100$
$= \$643.70$

$\frac{643.7}{2196} \times 100 = 29.3\%$

5. a) Complete the passage, using the most suitable words from the list below. **2**

bonus	**salary**
commission	**royalty**
interest	**wage**

Tania is a salesperson. She earns a base salary or retainer of $39 000 p.a., plus commission of 6% of all weekly sales above $1000.

b) How much would Tania earn in a week when she sold $5000 worth of goods? **2**

salary $= \frac{39000}{52} = \$750$

commission $= 4000 \times \frac{6}{100}$
$= \$240$

earnings $= 750 + 240$
$= \$990$

c) How much would she need to sell to earn $3000 in one fortnight? **3**

Commission $= 3000 - 750 \times 2$
$= 1500$

$1500 \div 0.06 = 25000$
$+ 2 \times 1000$ minimum sales

She would need to sell $27000 worth of goods

2

6. Jainil earns a salary of $96 200 p.a. He also received income of $4375 from his share portfolio. His allowable deductions were $800 in donations to charity and $720 in work related expenses.

a) Calculate Jainil's taxable income.

Taxable income = 96200 + 4375
− 800 − 720
= $99 055

b) Medicare levy is charged at 2% of taxable income. Calculate Jainil's Medicare levy.

Medicare levy = 0.02 × 99055
= $1981.10

c) Using the tax table provided, calculate Jainil's income tax payable. **2**

Taxable income	Tax on this income
0 – $18,200	Nil
$18,201 – $37,000	19c for each $1 over $18,200
$37,001 – $80,000	$3,572 plus 32.5c for each $1 over $37,000
$80,001 – $180,000	$17,547 plus 37c for each $1 over $80,000
$180,001 and over	$54,547 plus 45c for each $1 over $180,000

Income tax = 17547 +
0.37(99055 − 80 000)
= $24 597.35

d) Jainil has paid PAYG tax of $970 per fortnight throughout the financial year. Calculate his overall tax debt or tax refund. **3**

PAYG = 970 × 26 = 25 220

Total tax = 24597.35 + 1981.10
= 26578.45

Tax debt = 26578.45 − 25220
= $1358.45

7. Find the simple interest earned on an investment of $5000 invested at 2.4% p.a. for 3 years.

$I = PRN$
$= 5000 \times 0.024 \times 3$
$= \$360$

8. For how long would $12 000 need to be invested at 4% simple interest in order to have a final value of $20 000? **2**
Answer in years and months.

Interest = 20 000 − 12 000
= 8000

$I = PRN$
$8000 = 12000 \times 0.04 \times N$
$N = \frac{8000}{12000 \times 0.04}$
$= 16\frac{2}{3}$ years
16 years and 8 months

9. Calculate the compound interest earned when $23 000 is invested at 3% p.a. compounded monthly for 5 years. **3**

$A = P(1 + r)^n$
$= 23000\left(1 + \frac{3/12}{100}\right)^{5 \times 12}$
$= 26717.1859...$

$I = A - P$
$= 26717.19 - 23000$
$= \$3717.19$

Algebra (33 marks)

1. Simplify.

a) $3x^2 + 5y - x^2 + 2y$ $= 2x^2 + 7y$

b) $4m \times 6mn$ $= 24m^2n$

c) $9rs \div 27st$ $= \frac{r}{3t}$

d) $\frac{2a}{3} + \frac{a}{5}$ $= \frac{10a}{15} + \frac{3a}{15}$

$= \frac{13a}{15}$

e) $\frac{5a}{2b} - \frac{1}{b}$ $= \frac{5a - 2}{2b}$ 5

2. Simplify.

a) $\frac{x}{4} \times \frac{x}{2}$ $= \frac{x^2}{8}$

b) $\frac{12p}{q^2} \times \frac{4p^2q}{81}$ $= \frac{16p^3}{9q}$

c) $\frac{7t}{12} \div \frac{3t}{28}$ $= \frac{7t}{12_3} \times \frac{28^7}{3t}$

$= \frac{49}{9}$

d) $\frac{3u}{20v} \div \frac{2u^2}{5v} \times \frac{u}{12}$ **2**

$= \frac{3u}{20v} \times \frac{5v}{2u^2} \times \frac{u}{12_4}$

$= 1/32$ 5

3. Expand and simplify.

a) $5(3p - q)$ $= 15p - 5q$

b) $2m(4m + 7n)$ $= 8m^2 + 14mn$

c) $-11(3x - 2) - 8$ **2**

$= -33x + 22 - 8$

$= -33x + 14$

d) $3x(x + 3) - 2(x + 3)$ **2**

$= 3x^2 + 9x - 2x - 6$

$= 3x^2 + 7x - 6$ 6

4. Factorise.

a) $12a + 18$ $= 6(2a + 3)$

b) $16m^2 - 8mn$ $= 8m(2m - n)$

c) $2p(p + 4) + (p + 4)$

$= (p + 4)(2p + 1)$ 3

5. Cathy ran four 100 metre sprints. Her times were $3t - 2$, $t + 5$, $2t + 1$ and $2t + 8$ seconds. What was her average time? Give your answer in simplified form. **2**

$Av = \frac{1}{4}(3t - 2 + t + 5 + 2t + 1 + 2t + 8)$

$= \frac{1}{4}(8t + 12)$

$= 2t + 3$ seconds

6. Expand and simplify.

a) $(x + 2)(x + 3)$ **2**

$= x^2 + 3x + 2x + 6$

$= x^2 + 5x + 6$

b) $(2y - 1)(y + 3)$ **2**

$= 2y^2 + 6y - y - 3$

$= 2y^2 + 5y - 3$

c) $\left(m + \frac{2}{m}\right)\left(\frac{3}{m} - m\right) - \frac{1}{2m}\left(\frac{5}{m} - 6m\right)$ **3**

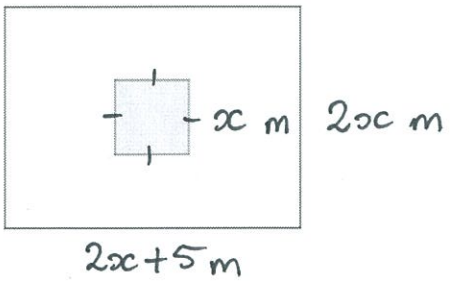
$= 3 - m^2 + \frac{6}{m^2} - 2 - \frac{5}{2m^2} + 3$

$= 4 - m^2 + \frac{12}{2m^2} - \frac{5}{2m^2}$

$= 4 - m^2 + \frac{7}{2m^2}$ 7

4

7. A square flower garden sits in the centre of a rectangular lawn. The lawn, which is covered in grass, is twice as long the flower garden, and the lawn is 5 metres wider than it is long.



Let x be the length of the flower garden in metres. Find simplified expressions for

a) The perimeter of the lawn.

$P = 2x + 2x + 2x + 5 + 2x + 5$

$= 8x + 10$ m

b) The area of grass. **2**

$A = 2x(2x+5) - x^2$

$= 4x^2 + 10x - x^2$

$= 3x^2 + 10x$ m^2

■ End of exam ■ Please check your work ■