



Topic: Tables and Formulas including spreadsheets

Time: 45 mins

Marks: /45 marks

Calculator Assumed

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

Ari is building a home office as an extension to his house. The office is to connect to an existing wall of the house and is to be rectangular in shape. He has to run smart wiring along the perimeter of the new walls. Ari only has 10 m of smart wiring to use.

- a) If x is the length of the office, complete the following table below to show which length provides the maximum area for the office, and state this area.

Length = x	Width	Area of the office
1 m	4.5 m	4.5 m ²
2 m	4 m	8 m ²
3 m		
4 m		
5 m		
6 m		
7 m		
8 m		
9m		
10m		

- b) Write the expression which represents the width in terms of x .
- c) Write the expression which represents the area of the office in terms of x .

Question Two: [8, 2, 2: 12 marks]

Mama Lou's mustard relish comes in 5 different sized cylindrical jars. The label is printed and covers the lid (top of the jar), then the entire surface is covered in an air tight plastic wrap to ensure it stays fresh.

Mama Lou uses a spreadsheet for all the necessary calculations.

	A	B	C	D	E
1	Radius	Height	Area of Lid	Area of Wrapping	Volume
2	A	6	50.27	251.33	301.59
3	6	8	113.10	527.79	904.78
4	8	10	B	904.78	2010.62
5	10	12	314.16	C	3769.91
6	12	14	452.39	1960.35	D

- a) A glitch in the computer software causes some cells to be left blank. Calculate the values for A, B, C and D to complete the table for Mama Lou.

- b) If the table continues, what would the formula for cell D8 look like?

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(Applications Course in WA)

- c) Mama Lou accidentally deleted all of column C. Explain why the following happened as a result.

	A	B	C	D	E
1	Radius	Height		Area of Wrapping	Volume
2	4	6		150.80	0.00
3	6	8		301.59	0.00
4	8	10		502.65	0.00
5	10	12		753.98	0.00
6	12	14		1055.58	0.00

Question Three: [2, 2, 2: 6 marks]

Kinetic energy is the energy of motion which is calculated by using the mass and the velocity of the object. Kinetic energy (k) is half the mass (m) times the velocity (v) squared.

- a) Write the formula for calculating kinetic energy.

Vince calculates his kinetic energy as he runs. Vince has a mass of 85 kg. He begins running at a velocity of 1.3 m/s.

- b) Use the table below to calculate his kinetic energy as he increases his speed.

Kinetic Energy	Velocity
	1.3 m/s
	2.3 m/s
	3.3 m/s
	4.3 m/s
	5.3 m/s
	6.3 m/s

- c) If Vince loses weight and reduces his mass, would this increase or decrease his kinetic energy? Explain your answer.

Question Four: [2, 2, 1, 3, 3: 11 marks]

Eric takes out a \$5000 loan. The loan accumulates interest at 5% per annum calculated monthly. Eric agrees to pay back \$200 each month.

Here are the figures for the first 5 months of Eric's loan.

Month	Opening Balance	Interest	Repayment	Closing Balance
1	5000	20.83	200.00	4820.83
2	4820.83	20.09	200.00	4640.92
3	4640.92	19.34	200.00	4460.26
4	4460.26	18.58	200.00	4278.84
5			200.00	

- a) Explain why the interest calculation for month 1 is not 5000×0.05 ?
- b) Complete the opening balance and interest for month 5.
- c) How is the closing balance calculated?

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- d) The table below shows the figures for the 25th month of Eric's loan. How long does it take to repay the loan in full and how much is Eric's final repayment?

25	487.52	2.03	200.00	289.55
26				
27				
28				

- e) What is the total amount Eric pays in interest?

Question Five: [2, 3, 3, 1: 9 marks]

Pressure is the ratio of force (F) applied per area (A) covered:

$$P = \frac{F}{A}$$

Pressure is measured in Pascals (Pa)

$$Pa = \frac{N}{m^2}$$

Where N is newtons

- a) While swimming in the ocean, the force exerted by the water on the back of your hand is about $1.1 \times 10^3 \text{ N}$ and the area of the back of your hand is about $8.34 \times 10^{-3} \text{ m}^2$. Calculate the pressure on your hand.

- b) If the pressure produced by a force acting on an area of 30 m^2 increased from 20 Pa to 50 Pa, what is the change in the force?

- c) Calculate the pressure produced by a force of 30 N acting on a circle with a radius of 5 cm.

- d) How does doubling the area which the force is acting upon, in part c, affect the pressure?



**Tables and Formulas including
spreadsheets SOLUTIONS**

Time: 45 mins

Marks: /45 marks

Calculator Assumed

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

Ari is building a home office as an extension to his house. The office is to connect to an existing wall of the house and is to be rectangular in shape. He has to run smart wiring along the perimeter of the new walls. Ari only has 10 m of smart wiring to use.

- a) If x is the length of the office, complete the following table below to show which length provides the maximum area for the office, and state this area.

Length = x	Width	Area of the office
1 m	4.5 m	4.5 m ²
2 m	4 m	8 m ²
3 m	3.5 m	10.5 m ²
4 m	3 m	12 m ²
5 m	2.5 m	12.5 m ²
6 m	2 m	12 m ²
7 m	1.5 m	10.5 m ²
8 m	1 m	8 m ²
9m	0.5 m	4.5 m ²
10m	0 m	0 m ²

$A = 12.5 \text{ m}^2$

- b) Write the expression which represents the width in terms of x .

$W = \frac{10 - x}{2}$

- c) Write the expression which represents the area of the office in terms of x .

$A = \frac{x(10 - x)}{2}$

Question Two: [8, 2, 2: 12 marks]

Mama Lou's mustard relish comes in 5 different sized cylindrical jars. The label is printed and covers the lid (top of the jar), then the entire surface is covered in an air tight plastic wrap to ensure it stays fresh.

Mama Lou uses a spreadsheet for all the necessary calculations.

	A	B	C	D	E
1	Radius	Height	Area of Lid	Area of Wrapping	Volume
2	A	6	50.27	251.33	301.59
3	6	8	113.10	527.79	904.78
4	8	10	B	904.78	2010.62
5	10	12	314.16	C	3769.91
6	12	14	452.39	1960.35	D

- a) A glitch in the computer software causes some cells to be left blank. Calculate the values for A, B, C and D to complete the table for Mama Lou.

A: $50.27 = \pi r^2$
 $r = 4$ ✓✓

B: $\pi \times 8^2 = 201.06$ ✓✓

C: $2 \times \pi \times 10^2 + 2\pi \times 10 \times 12$
 $= 1382.30$ ✓✓

D: $\pi \times 12^2 \times 14$
 $= 6333.45$ ✓✓

- b) If the table continues, what would the formula for cell D8 look like?

$D8 = 2\pi \times A8^2 + 2 \times \pi \times A8 \times B8$
 ✓✓

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- c) Mama Lou accidentally deleted all of column C. Explain why the following happened as a result.

	A	B	C	D	E
1	Radius	Height		Area of Wrapping	Volume
2	4	6		150.80	0.00
3	6	8		301.59	0.00
4	8	10		502.65	0.00
5	10	12		753.98	0.00
6	12	14		1055.58	0.00

Her formula for column E must have been column C x column B and the volume cannot be calculated without column C.

Question Three: [2, 2, 2: 6 marks]

Kinetic energy is the energy of motion which is calculated by using the mass and the velocity of the object. Kinetic energy (k) is half the mass (m) times the velocity (v) squared.

- a) Write the formula for calculating kinetic energy.

$$k = \frac{1}{2}m \times v^2$$

Vince calculates his kinetic energy as he runs. Vince has a mass of 85 kg. He begins running at a velocity of 1.3 m/s.

- b) Use the table below to calculate his kinetic energy as he increases his speed.

Kinetic Energy	Velocity
71.825	1.3 m/s
224.825	2.3 m/s
462.825	3.3 m/s
785.825	4.3 m/s
1193.825	5.3 m/s
1686.825	6.3 m/s

- c) If Vince loses weight and reduces his mass, would this increase or decrease his kinetic energy? Explain your answer.

Decrease Since the velocity² would be multiplied by a smaller amount.

Question Four: [2, 2, 1, 3, 3: 11 marks]

Eric takes out a \$5000 loan. The loan accumulates interest at 5% per annum calculated monthly. Eric agrees to pay back \$200 each month.

Here are the figures for the first 5 months of Eric's loan.

Month	Opening Balance	Interest	Repayment	Closing Balance
1	5000	20.83	200.00	4820.83
2	4820.83	20.09	200.00	4640.92
3	4640.92	19.34	200.00	4460.26
4	4460.26	18.58	200.00	4278.84
5	4278.84	17.83	200.00	4096.67

- a) Explain why the interest calculation for month 1 is not 5000×0.05 ?

0.05 is interest per annum, so the monthly interest rate is 0.00417

- b) Complete the opening balance and interest for month 5.

- c) How is the closing balance calculated?

Opening balance + interest - repayment

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- d) The table below shows the figures for the 25th month of Eric's loan. How long does it take to repay the loan in full and how much is Eric's final repayment?

25	487.52	2.03	200.00	289.55
26	289.55	1.21	200	90.76
27	90.76	0.38	91.14	0 ✓
28				

27 months. Final repayment of \$91.14



- e) What is the total amount Eric pays in interest?



$$26 \times 200 + 91.14 - 5000 = \$291.14$$

Question Five: [2, 3, 3, 1: 9 marks]

Pressure is the ratio of force (F) applied per area (A) covered:

$$P = \frac{F}{A}$$

Pressure is measured in Pascals (Pa)

$$Pa = \frac{N}{m^2}$$

Where N is newtons

- a) While swimming in the ocean, the force exerted by the water on the back of your hand is about $1.1 \times 10^3 \text{ N}$ and the area of the back of your hand is about $8.34 \times 10^{-3} \text{ m}^2$. Calculate the pressure on your hand.

$$P = \frac{1.1 \times 10^3}{8.34 \times 10^{-3}} = 131\,894.48 \text{ Pa}$$



(one mark for units)

- b) If the pressure produced by a force acting on an area of 30 m^2 increased from 20 Pa to 50 Pa , what is the change in the force?

$$20 = \frac{F}{30}$$

$$F = 600$$



$$50 = \frac{F}{30}$$

$$F = 1500$$



Change of 900 N



(one mark for units)

- c) Calculate the pressure produced by a force of 30 N acting on a circle with a radius of 5 cm .

$$P = \frac{30}{\pi \times 0.05^2}$$



$$= 3819.72 \text{ Pa}$$



(one mark for units)

- d) How does doubling the area which the force is acting upon, in part c, affect the pressure?

Pressure is halved

