Government of South Australia

SACE Board of SA

External Examination 2012

2012 MATHEMATICAL APPLICATIONS, Semester 2

TOPIC 3

FOR OFFICE USE ONLY

SUPERVISOR CHECK

RE-MARKED

ATTACH SACE REGISTRATION NUMBER LABEL TO THIS BOX

Graphics calculator ☐

Brand _____

Model _____

Computer software ☐

Tuesday 30 October: 9 a.m.

Time: 1½ hours in total (to complete two question booklets, one on each topic studied in Semester 2)

Pages: 12
Questions: 5

Topic 3: Mathematics and Small Business

Examination material: two question booklets
two SACE registration number labels

Approved dictionaries, notes, calculators, and computer software may be used.

Instructions to Students

1. You will have 10 minutes to read the question booklets. You must not write in your question booklets or use a calculator during this reading time but you may make notes on the scribbling paper provided.

2. Each of the following five topics is printed in a separate question booklet. ***Tick the boxes by the two topics you have studied in Semester 2:***

   Topic 1: Applied Geometry ☐
   Topic 2: Investment and Loans ☐
   Topic 3: Mathematics and Small Business ☐
   Topic 6: Share Investments ☐
   Topic 7: Statistics and Working with Data. ☐

3. The total mark for each topic is 35.

4. Answer ***all*** parts of Questions 1 to 5 in the spaces provided in this question booklet. There is no need to fill all the space provided. You may write on page 7 if you need more space, making sure to label each answer clearly.

5. Show all working in this booklet. (You are strongly advised ***not*** to use scribbling paper. Work that you consider incorrect should be crossed out with a single line.)

6. Use only black or blue pens for all work other than graphs and diagrams, for which you may use a sharp dark pencil.

7. Appropriate steps of logic and correct answers are required.

8. Marks may be deducted if you do not clearly show all steps in the solution of problems, if your answers have an inappropriate number of decimal places, or if you use incorrect units.

9. Diagrams, where given, are not necessarily drawn to scale.

10. Complete the box on the top right-hand side of this page with information about the electronic technology you are using in this examination.

11. Attach one of your SACE registration number labels to the box at the top of this page.

12. At the end of the examination, place one question booklet inside the back cover of the other question booklet.

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QUESTION 1

Refer to the following table when answering this question:

2011–12 Tax Rates

Taxable Income	Tax on This Income
0 – $6000	nil
$6001 – $37 000	15c for each $1 over $6000
$37 001 – $80 000	$4650 plus 30c for each $1 over $37 000
$80 001 – $180 000	$17 550 plus 37c for each $1 over $80 000
$180 001 and over	$54 550 plus 45c for each $1 over $180 000

For all taxation calculations in this question disregard the Medicare levy.

In the last financial year Jason earned $24 000 and Josie earned $58 000 from their part-time teaching jobs.

(a) Calculate the individual tax payable by Josie.

(1 mark)

(b) Jason and Josie also own a tutoring business as a partnership. Jason has a 25% share and Josie has a 75% share in this business.

The business earned a profit of $42 000 in the last financial year.

(i) Show that Josie's total income, including her share of the business profit, is $89 500.

(2 marks)

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(ii) With his share of the business profit included in his income, Jason will pay $4275 tax.

(1) Calculate the tax Josie will pay on her income as calculated in part (b)(i).

(1 mark)

(2) Calculate Jason and Josie's combined tax.

(1 mark)

(iii) Explain why Jason and Josie might pay a lower combined amount of tax if they had equal shares in the business.

(2 marks)

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QUESTION 2

Nicole and David run a small supermarket. The busiest time of the day is between 5 p.m. and 6 p.m. There always seems to be a long queue at this time and the two regular servers are overworked, so Nicole and David have taken on a temporary third server.

They know that at 5 p.m.:

- three servers will be available to serve (Server 3 is required to serve only when Server 1 and Server 2 are both busy)
- five people will be in the queue
- a new customer will arrive every 2 minutes
- a service time of 3 minutes will be needed for each customer.

They also know that Server 2 will be unavailable to serve for 8 minutes from 5.06 p.m.

(a) Complete the following table.

Customer	Arrival Time	Server	Start Service	Finish Service	Customer Waiting Time (min)	Server Idle Time (min)
1	5.00	1	5.00	5.03	0	0
2	5.00	2	5.00	5.03	0	0
3	5.00	3	5.00	5.03	0	0
4	5.00	1	5.03	5.06	3	0
5	5.00	2	5.03	5.06	3	0
6	5.02					
7	5.04					
8	5.06					
9	5.08					
10	5.10					
11	5.12					
12	5.14					
13	5.16		5.16	5.19	0	1
14	5.18		5.18	5.21	0	1
15	5.20		5.20	5.23	0	1
16	5.22		5.22	5.25	0	1
				Total	10	

(4 marks)

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(b) Calculate the average customer waiting time for the first sixteen customers.

(1 mark)

(c) Show that the idle time for Server 3 is 52%.

(2 marks)

(d) Using your answers to parts (a), (b), and (c), state whether or not you think the business needs three servers. Give a reason for your answer.

(2 marks)

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QUESTION 3

The Parks and Gardens Service incurred the following payroll costs in June 2012:

- gross wages $102 650.53
- overtime $10 143.71
- compulsory employer superannuation contributions $9238.55
- health insurance premiums for employees $1052.50
- bonuses $1100.

The gross wages included a termination payment of $457.87.

The following fees must be included:

- occupational health, safety, and welfare fee 1%
- GST 10%.

Calculate the total WorkCover levy payable if the Parks and Gardens Service's premium rate is 3.70% with a penalty of 0.65%.

(5 marks)

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You may write on this page if you need more space to finish your answers to Topic 3. Make sure to label each answer carefully (e.g. 'Question 4(b)(ii) continued').

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QUESTION 4

Build-It-Quick Constructions build sheds. The selling price per shed is \$5500. The costs can be broken down as follows:

Fixed Costs

- \$35 000

Variable Costs

- materials \$1700
- labour \$1800
- delivery \$240.

(a) (i) Write down the total revenue function for the sheds built by Build-It-Quick Constructions. Let x represent the number of sheds built.

(1 mark)

(ii) Tick the appropriate box to indicate which *one* of the following functions demonstrates the total cost function for the sheds built by Build-It-Quick Constructions.

- $C(x) = 35\,000 - 3740x$ ☐
- $C(x) = 3740x + 35\,000$ ☐
- $C(x) = 35\,000x + 3740$ ☐

(1 mark)

(b) (i) Calculate the marginal income per shed.

(1 mark)

(ii) Determine the number of sheds that will need to be built for the business to break even.

(2 marks)

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(c) (i) The manager of Build-It-Quick Constructions decides to increase the selling price by 12%.

Calculate the number of sheds that will now need to be built for the business to break even. Assume that all costs remain the same.

(2 marks)

(ii) The manager assumes that the number of sheds calculated in part (c)(i) for break-even purposes could be used to forecast profit in the following years.

State *one* limitation of this assumption.

(1 mark)

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QUESTION 5

Danny and Sam's video rental and sales business began trading as a partnership on 1 July 2011. The accounting records for this business contained the following information for the year ended 30 June 2012:

- income from rental of videos $225 000
- advertising $58 000
- stationery $2420
- salaries $100 000
- interest paid $20 020
- insurance $6200
- sales $320 000
- telephone $3000
- opening stock $90 000 (1 July 2011)
- purchases $110 000
- rent paid $6000
- closing stock $60 000 (30 June 2012)
- promotional expenses $40 000
- motor vehicle $50 000 (depreciation allowed is 20% per annum).

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(a) Using the information on page 10, complete a profit-and-loss statement for the partnership for the year ended 30 June 2012, to show the gross profit and net profit/loss.

Profit-and-Loss Statement for Year Ended 30 June 2012

Sales		$320 000
Total Revenue		( )
Less cost of goods sold		
Opening stock		
Plus purchases		
Goods available for sale		
Less closing stock		
	$140 000	($140 000)
Gross Profit		
Less expenses		
Advertising	$58 000	
Stationery	$2 420	
Salaries	$100 000	
Insurance	$ 6 200	
Rent	$ 6 000	
Promotional expenses	$ 40 000	
Telephone	$ 3 000	
		( )
Net Profit/Loss		

(5 marks)

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(b) Danny and Sam are considering trading as a company.

State *one* benefit that Danny and Sam might gain if they changed the business structure to a company.

(1 mark)

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