



Baldivis Secondary College

Semester One Examination, 2019

Question/Answer booklet

MATHEMATICS APPLICATIONS UNIT 1

Section Two:
Calculator-assumed

SOLUTIONS

Student number: In figures

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In words

Your name

Time allowed for this section

Reading time before commencing work:
Working time:

ten minutes
one hundred minutes

Materials required/recommended for this section

To be provided by the supervisor

This Question/Answer booklet
Formula sheet (retained from Section One)

To be provided by the candidate

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: drawing instruments, templates, notes on two unfolded sheets of A4 paper, and up to three calculators approved for use in this examination

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Working time (minutes)	Marks available	Percentage of examination
Section One: Calculator-free	8	8	50	52	35
Section Two: Calculator-assumed	13	13	100	98	65
Total					100

Instructions to candidates

1. The rules for the conduct of examinations are detailed in the school handbook. Sitting this examination implies that you agree to abide by these rules.
2. Write your answers in this Question/Answer booklet preferably using a blue/black pen. Do not use erasable or gel pens.
3. You must be careful to confine your answer to the specific question asked and to follow any instructions that are specified to a particular question.
4. Show all your working clearly. Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks. If you repeat any question, ensure that you cancel the answer you do not wish to have marked.
5. It is recommended that you do not use pencil, except in diagrams.
6. Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.
7. The Formula sheet is not to be handed in with your Question/Answer booklet.

Section Two: Calculator-assumed

65% (98 Marks)

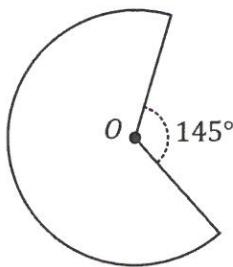
This section has **thirteen (13)** questions. Answer **all** questions. Write your answers in the spaces provided.

Working time: 100 minutes.

Question 9

(5 marks)

A sector of a circle of radius 40 cm is shown below.



- (a) Show that the perimeter of the sector is 230 cm, when rounded to the nearest cm.

(3 marks)

Solution
Interior angle: $360 - 145 = 215^\circ$ ← 215 not 145
Arc length: $L = 2\pi(40) \times \frac{215}{360} = 150$
Perimeter: $P = 150 + 40 + 40 = 230 \text{ cm}$
Specific behaviours
✓ interior angle ✓ arc length ✓ total perimeter

- (b) Determine the area of the sector.

(2 marks)

Solution
Area: $A = 2\pi(40)^2 \times \frac{215}{360}$
$A = 5027 \times \frac{215}{360} \approx 3000 \text{ cm}^2$
Specific behaviours
✓ area of circle ✓ area of sector

Question 10

(7 marks)

- (a) Calculate the value of f given that $f = \frac{1}{d}$ and $d = \frac{1}{d_1} + \frac{1}{d_2}$ when $d_1 = 0.52$ and $d_2 = 2.86$. (2 marks)

Solution
$d = \frac{1}{0.52} + \frac{1}{2.86} = \frac{25}{11} = 2.\overline{27}$
$f = 1 \div \frac{25}{11} = 0.44$
Specific behaviours
✓ correct value of d
✓ correct answer

- (b) The future value, F , of an annuity can be calculated using the formula below.

$$F = \frac{C}{r} \left(\left(1 + \frac{r}{n} \right)^{nt} - 1 \right)$$

Consider an annuity with values $C = \$2\,500$, $r = 0.035$, $n = 4$ and $t = 5$.

- (i) Calculate the future value, rounding your answer to the nearest dollar. (3 marks)

Solution
$F = \frac{2500}{0.035} \left(\left(1 + \frac{0.035}{4} \right)^{4 \times 5} - 1 \right)$
$F = 13595.70$
$F \approx \$13\,596 \text{ (nearest \$)}$
Specific behaviours
✓ evidence of correct substitution
✓ calculates F
✓ value to nearest dollar

- (ii) Calculate the change in F when the value of n is changed from 4 to 12. (2 marks)

Solution
$F \approx \$13\,639 \text{ (nearest \$)}$
Increase of $13\,639 - 13\,596 = \$43$
Specific behaviours
✓ calculates F
✓ correct increase

Calculation

Change

Question 11

(8 marks)

- (a) A triangle has sides of length 72 cm, 97 cm and 65 cm. State, with reasons, whether the triangle is right-angled. (2 marks)

Solution
$65^2 + 72^2 = 9409 = 97^2$
Hence triangle is right-angled as the side lengths satisfy Pythagoras' theorem . <i>not stated</i>
Specific behaviours
✓ shows use of $a^2 + b^2 = c^2$
✓ explanation (must use bolded words)

- (b) A 2.5 m long ladder leans against a 1.8 m tall wall with the foot of the ladder 0.8 m away from the base of the wall on level ground.

- (i) Draw a sketch of this situation, showing the ladder extending beyond the top of the wall. (2 marks)

Solution
Specific behaviours
✓ sketch with right-angle <i>no right angle</i>
✓ includes lengths

- (ii) Calculate the distance the ladder extends beyond the top of the wall. (2 marks)

Solution
$\sqrt{0.8^2 + 1.8^2} = 1.97$
$2.5 - 1.97 = 0.53 \text{ m}$
Specific behaviours
✓ length touching wall
✓ distance extended

- (iii) The foot of the ladder is moved along the ground and away from the base of the wall until the top of the ladder is just touching the top of the wall. Determine how far the foot of the ladder was moved. (2 marks)

Solution
Distance from bottom of wall: $\sqrt{2.5^2 - 1.8^2} = 1.735$
Moved $1.735 - 0.8 = 0.935 \text{ m}$
Specific behaviours
✓ distance from wall
✓ distance moved

Question 12

(6 marks)

A researcher at a weather station uses the following formula to calculate A , the absolute humidity of the air, where H is the relative humidity and T is the air temperature.

$$A = \frac{12.7 \times H \times (1.07)^T}{T + 273}$$

- (a) Calculate A when $H = 55$ and $T = 30$.

(2 marks)

Solution	
$A = \frac{12.7 \times 55 \times (1.07)^{30}}{30 + 273}$ $= 17.55$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ substitutes correctly ✓ correct value 	

The formula for A was used to create the spreadsheet below for various values of H and T .

A		H				
		40	50	60	70	80
T	-10	0.98	1.23	1.47	1.72	P
	0	1.86	2.33	2.79	3.75	3.72
	10	3.53	4.41	5.30	6.18	7.06
	20	Q	8.39	10.06	11.74	13.42

- (b) Calculate the value of the entries P and Q shown in the spreadsheet.

(2 marks)

Solution	
$P = 1.96$ $Q = 6.71$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ value of P ✓ value of Q 	

• Rounding
• Calculator use

- (c) One of the entries in the spreadsheet is incorrect. State the value of T and the value of H for the cell in which the incorrect value lies and calculate the correct value of A . (2 marks)

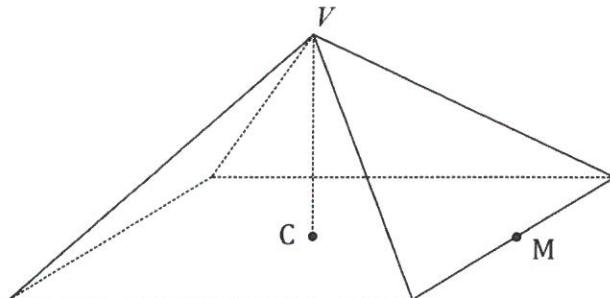
Solution	
$T = 0, H = 70$ $A = 3.26$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ correct values of T and H ✓ correct value of A 	

This 3.75 looks too high compared to the 3.72 next to it.

Question 13

(6 marks)

A bakery sells a specialty cake in the shape of a square-based pyramid. The sides of the square are all 32 cm and the vertex of the pyramid, V , lies 21 cm directly above the centre of the square base, C . The mid-point of one of the sides of the square is M .



- (a) Determine the volume of the cake.

(2 marks)

Solution	
$V = \frac{1}{3}(32 \times 32) \times 21$	<i>Not doing area of the base</i>
$= 7168 \text{ cm}^3$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ indicates area of base ✓ correct volume 	

- (b) Calculate the length
- VM
- .

(2 marks)

Solution	
$MC = 32 \div 2 = 16$	
$VM = \sqrt{21^2 + 16^2}$	
$= 26.4 \text{ cm}$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ indicates lengths MC and VC ✓ correct distance 	

- (c) The four triangular faces are iced at a cost of 1.4 cents per square cm. Determine the cost of icing the cake, in dollars and cents.

(2 marks)

Solution	
$A = 4 \times \frac{1}{2} \times 32 \times 26.4$	<i>not using the height of the side face triangle.</i>
$= 1689.6$	
$C = 1689.6 \times 0.014$	<i>C not \$, Dividing instead of multiply</i>
$= \$23.65$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ correct TSA ✓ correct cost 	

not doing 4 triangles

Question 14

(9 marks)

The weekly sales of Sumsang phones (the Ten, Plus and Note models) at retail outlets A , B and C is shown in matrix M .

$$M = \begin{bmatrix} A & B & C \\ 60 & 25 & 36 \\ 42 & 32 & 28 \\ 55 & 30 & 34 \end{bmatrix} \begin{array}{l} \text{Ten} \\ \text{Plus} \\ \text{Note} \end{array}$$

- (a) In total, how many Note models were sold?

(1 mark)

Solution
$55 + 30 + 34 = 119$
Specific behaviours
✓ correct number

- (b) What does the element m_{21} in matrix M represent?

(1 mark)

Solution
The number of Plus models sold by store A
Specific behaviours
✓ mentions store and model

- (c) Determine the matrix Q , where $Q = [1 \ 1 \ 1] \times M$, and explain what Q shows. (2 marks)

Solution
$Q = [157 \ 87 \ 98]$
The total number of phones sold at each of the stores during the week.
Specific behaviours
✓ correct Q
✓ correct explanation —missing

Not using
calculator ✓

- (d) Determine the matrix N , where $N = M \times \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$, and explain what N shows. (2 marks)

Solution
$N = \begin{bmatrix} 121 \\ 102 \\ 119 \end{bmatrix}$
The total number of each model sold during the week.
Specific behaviours
✓ correct N
✓ correct explanation —missing

Not using calculator ✓

(e) The Ten, Plus and Note models are sold for \$899, \$949 and \$1 149 respectively.

- (i) Use this information to write matrix P that can be multiplied by matrix N to yield a sensible result. (1 mark)

Solution
$P = [899 \ 949 \ 1149]$
Specific behaviours
✓ correct matrix

Writing the wrong number
down

- (ii) Multiply matrices P and N together and explain what the result shows. (2 marks)

Solution
$P \times N = [342308]$ ← not doing it
The total sales income from selling all the phones at all the stores.
Specific behaviours
✓ correct product, as matrix
✓ correct explanation — missing

Question 15

(7 marks)

A shop sold three sizes of the same brand of soy sauce. The 225 mL bottle cost \$2.70, the 375 mL bottle cost \$4.35 and the 660 mL bottle cost \$8.25.

Retail laws require the shop to display the price per 100 mL for each bottle, to the nearest cent.

- (a) Calculate the price per 100 mL for all three sizes of soy sauce. (3 marks)

Solution
225: $270 \div 225 \times 100 = 120$ c
375: $435 \div 375 \times 100 = 116$ c
660: $825 \div 660 \times 100 = 125$ c
Specific behaviours
✓ uses unit cost for one size
✓ correct 100 mL price for one size
✓ all three prices correct

225 ÷ 270 instead

- (b) Use the unit prices to list the bottle sizes in order of value, from best to worst. (1 mark)

Solution
375 mL, 225 mL, 660 mL
<i>Not best sizes</i>
Specific behaviours
✓ correct order — thinking 1.2 is lower than 1.16

- (c) Determine the maximum price, to the nearest cent, for a 525 mL bottle of the same sauce if the shop wanted it to be better value than the other three sizes in terms of unit price. (2 marks)

Solution
$525 \div 100 \times 116 = 609$ c
<i>Wrong 1.19 not 1.16</i>
To be best value, price must be less, so \$6.08.
Specific behaviours
✓ calculates price to be equal best
✓ correct price
<i>Don't go for max price to be better value</i>

- (d) Suggest one reason that a shopper may prefer a size other than that which offers the best value in terms of unit price. (1 mark)

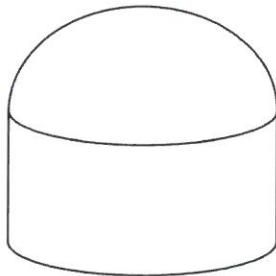
Solution
- avoid wastage
- don't have enough money, etc, etc
Specific behaviours
✓ sensible reason

Question 16

(6 marks)

A wood turner crafted solid shape S as shown below - a hemisphere of radius 15 cm atop a cylinder with the same radius and height 18 cm.

Generally bad on this Qn



- (a) The wood turner started out with a block of wood in the shape of a rectangular prism with dimensions $40 \times 35 \times 35$ cm. Determine the volume of wood that was removed from this block to end up with shape S . (3 marks)

Solution
$V_{CYL} = \pi(15)^2(18)$ $= 12723$
$V_{HS} = \frac{1}{2} \times \frac{4}{3} \times \pi(15)^3$ $= 7069$
$V_{PRISM} = 40 \times 35 \times 35 = 49000$ $V_{REMOVED} = 49000 - 12723 - 7069$ $= 29208 \text{ cm}^3$
Specific behaviours
<ul style="list-style-type: none"> ✓ cylinder volume ✓ hemisphere volume ✓ correct volume removed

Not getting right answer with correct formula

- (b) Shape S was then cut vertically into two congruent halves. Determine the area of one of the cut faces. (3 marks)

Solution
$A_{SEMICIRCLE} = \frac{1}{2} \times \pi \times 15^2$ $= 353$
$A_{RECTANGLE} = 30 \times 18$ $= 540$
$A_{CUT} = 353 + 540$ $= 893 \text{ cm}^2$
Specific behaviours
<ul style="list-style-type: none"> ✓ uses correct cross-sections ✓ semi-circle area ✓ correct total

Using ~~the~~ surface area instead of the area of the cut

Question 17

(12 marks)

A spreadsheet to track a monthly car budget is shown below, with all amounts in dollars. The figures for months 1, 2 and 3 show the actual expenditure for each item.

Item	Monthly Budget	Month 1	Month 2	Month 3	3-Month Total
Loan payment	405	405	405	405	1215
Insurance	225	225	225	225	R
Maintenance	108	0	458	45	503
Fuel	162	215	174	Q	582
Total	P	845	1262	858	S

- (a) Determine the values of P , Q , R and S in the spreadsheet.

(3 marks)

Solution
$P = 900$
$Q = 582 - (215 + 174) = 193$
$R = 3 \times 225 = 675$
$S = 2975$
Specific behaviours
✓ one correct value
✓ at least 3 correct values
✓ all correct values

- (b) A motoring organisation recommends allocating no more than 15% of a person's monthly income to running a car. Would a person on a salary of \$67 500 pa and using the total monthly budget figure above meet this target? Justify your answer. (3 marks)

Solution
$67500 \div 12 = 5625$
<i>Dividing by 12 instead of 12</i>
Target: $5625 \times 0.15 = \$843.75$
Since the budget total is \$900 but the recommended maximum is only \$843.75, they do not meet the target.
Specific behaviours
✓ calculates monthly salary
✓ calculates correct percentage
✓ explains why they do not meet target

- (c) Over the three months shown, the total actual expenditure for two items exceeded their budgeted figures.

- (i) Which items were these?

(1 mark)

Solution
Maintenance and fuel
Specific behaviours
✓ correct items

- (ii) Determine which of these two items exceeded their budgeted figure by the largest percentage. (3 marks)

*

Solution
Maintenance: $503 - 3(108) = 503 - 324 = 179$
$\frac{179}{324} \times 100 = 55\%$
Fuel: $582 - 3(162) = 582 - 486 = 96$
$\frac{96}{486} \times 100 = 20\%$
Maintenance exceeded by the largest percentage.
Specific behaviours
✓ % figure for maintenance
✓ % figure for fuel
✓ states correct item

→ Not doing half
much it exceeded.

- (d) The monthly budget figure for insurance includes a 10% tax. Determine the cost of the insurance without this tax. (2 marks)

*

Solution
$225 \div 1.10 = \$204.55$
Specific behaviours
✓ indicates appropriate method
✓ correct cost, to nearest cent

→ Not dividing by 1.1, just subtracting
10%

Question 18**(8 marks)**

Single people aged between 18 and 21, living at home and looking for work qualify for the youth allowance of \$304.40 per fortnight, unless they earn more than \$668.17 in that time, in which case no allowance is paid.

In any fortnight that they earn between \$143 and \$250, the allowance will be reduced by 50 cents in the dollar for earnings over \$143.

In any fortnight that they earn between \$250 and \$668.17, the allowance will be reduced by \$53.50 plus 60 cents in the dollar for earnings over \$250.

Determine, with justification, the fortnightly youth allowance paid to each of the following.

- (a) Alex, who earns \$66 per week.

(2 marks)

Solution
$66 \times 2 = \$132$
Full allowance of \$304.40
Specific behaviours
<ul style="list-style-type: none"> ✓ indicates fortnightly earnings ✓ correct allowance

- (b) Bay, who has a part time job paying \$15.25 per hour for 12 hours each fortnight. (3 marks)

Solution
$15.25 \times 12 = \$183$
Will lose use 304.40 instead $(183 - 143) \times 0.5 = \20
Allowance of $304.40 - 20 = \$284.40$
Specific behaviours
<ul style="list-style-type: none"> ✓ indicates fortnightly earnings ✓ indicates correct deduction ✓ correct allowance

- (c) Cara, who is paid \$16.40 per hour for working 6 hours a day for 3 days a week.

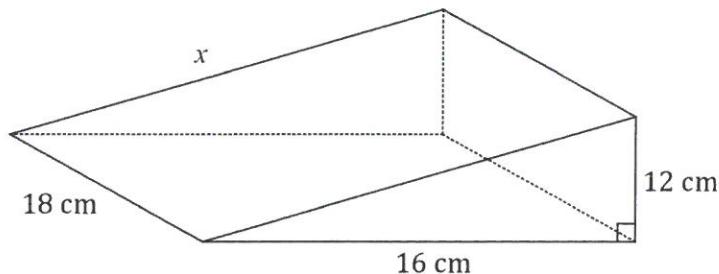
(3 marks)

Solution
$16.40 \times 6 \times 3 \times 2 = \590.40
Will lose $(590.40 - 250) \times 0.6 = 204.24$
Allowance of $304.40 - 53.50 - 204.24 = \46.66
Specific behaviours
<ul style="list-style-type: none"> ✓ indicates fortnightly earnings ✓ indicates correct deduction ✓ correct allowance

Question 19

(8 marks)

A model of a ramp in the shape of a right-triangular prism has dimensions shown in the diagram below.



- (a) Calculate x , the length of the sloping face.

(2 marks)

Solution	
$x^2 = 16^2 + 12^2$	
$x = \sqrt{400} = 20 \text{ cm}$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ indicates use of Pythagoras' theorem ✓ correct length 	

- (b) Determine the total surface area of the model.

(3 marks)

Solution	
Triangular ends: $2 \times \frac{1}{2} \times 16 \times 12 = 192$	
Rectangles: $18 \times (12 + 16 + 20) = 864$	
TSA: $192 + 864 = 1056 \text{ cm}^2$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ indicates area of triangle ✓ indicates area of rectangle ✓ correct TSA 	

Forgetting one or
the ends/sides

- (c) Determine the volume of the model.

(1 mark)

Solution	
Volume: $\frac{1}{2} \times 16 \times 12 \times 18 = 1728 \text{ cm}^3$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ correct volume 	

Doing a rectangular
prism

- (d) The actual ramp is to be made from concrete that costs \$65 per cubic metre. Given that the volume of the actual ramp is 125 times the volume of the model, determine the cost of concrete for the actual ramp.

(2 marks)

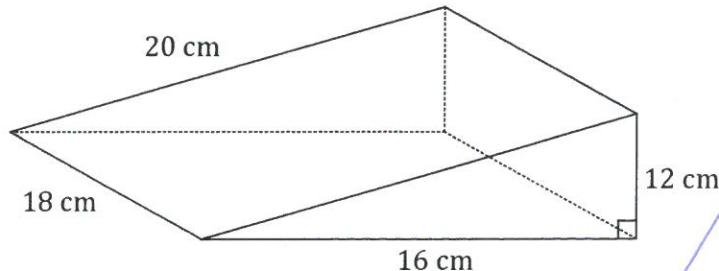
Solution	
Volume: $1728 \times 125 = 216000 \text{ cm}^3$	
Cost: $216000 \div 1000000 \times 65 = \14.04	
Specific behaviours	
<ul style="list-style-type: none"> ✓ indicates volume in cc ✓ correct cost 	

most got this
wrong
Needs to
be reasonable!

Question 19

(8 marks)

A right-triangular prism has dimensions shown in the diagram below.



- (a) Determine the total surface area of the prism.

(3 marks)

Solution	
Triangular ends: $2 \times \frac{1}{2} \times 16 \times 12 = 192$	
Rectangles: $18 \times (12 + 16 + 20) = 864$	
TSA: $192 + 864 = 1056 \text{ cm}^2$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ indicates area of triangle ✓ indicates area of rectangle ✓ correct TSA 	

- (b) An eighth-size model is made of the prism, i.e. using a scale of 1:8. Calculate the total surface area of this model.

(2 marks)

Solution	
Area scale factor: $\left(\frac{1}{8}\right)^2 = \frac{1}{64}$	
Area: $1056 \times \frac{1}{64} = 16.5 \text{ cm}^2$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ indicates area scale factor ✓ correct area 	

- (c) Determine the volume of the prism.

(1 mark)

Solution	
Volume: $\frac{1}{2} \times 16 \times 12 \times 18 = 1728 \text{ cm}^3$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ correct volume 	

- (d) Another scale model is made of the prism, so that the dimensions of the sloping face are now 3.6 cm by 4 cm. Calculate the volume of this scale model.

(2 marks)

Solution	
Scale factor: $\frac{4}{20} = \frac{1}{5}$. Volume sf $\left(\frac{1}{5}\right)^3 = \frac{1}{125}$	
Volume: $1728 \times \frac{1}{125} = 13.824 \text{ cm}^3$	
Specific behaviours	
<ul style="list-style-type: none"> ✓ indicates scale factor for length and volume ✓ correct volume 	

Question 20

(8 marks)

- (a) An investor pays \$57 250 into a new account offering interest of 2.85% pa, with interest payable every 90 days. The investor closes the account and withdraws the principal and interest just after the first interest payment.

Calculate the amount they withdraw.

(3 marks)

Solution
$I = 57250 \times 0.0285 \times 90 \div 365$ $= 402.32$
$57250 + 402.32 = \$57\,652.32$
Specific behaviours
<ul style="list-style-type: none"> ✓ correctly substitutes ✓ calculates interest ✓ correct withdrawal

3 months \neq 0.4 years

- (b) Another person invested \$4 000 with a bank that offered an interest rate of 5.2% pa.

- (i) Determine the value of the investment after two years when interest is compounded annually.

(2 marks)

Solution
$A = 4000(1 + 0.052)^2$ $= \$4\,426.82$
Specific behaviours
<ul style="list-style-type: none"> ✓ correctly substitutes ✓ correct value

- (ii) The person was advised that they would be better off after two years if they invested the same sum with another bank that was offering an interest rate of 5.1% pa compounded monthly. State, with justification, whether this was good advice.

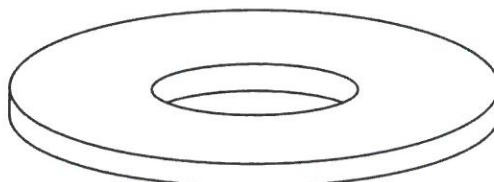
(3 marks)

Solution
$A = 4000 \left(1 + \frac{0.051}{12}\right)^{2 \times 12}$ $= \$4\,428.58$
Advice was good - they were \$1.76 better off.
Specific behaviours
<ul style="list-style-type: none"> ✓ correctly substitutes ✓ correct value ✓ correct conclusion

Question 21

(8 marks)

The washer shown below is made of plastic and has an internal radius of 9 mm, an external radius of 23 mm and is 4 mm thick.



- (a) The plastic used to make the washers costs 75 cents per litre. Given that one litre is 1 000 cubic centimetres, determine the cost of making 5 000 of the washers. (4 marks)

Solution
Outer volume: $\pi \times 2.3^2 \times 0.4 = 6.648$
Inner volume: $\pi \times 0.9^2 \times 0.4 = 1.018$
Total volume: $(6.648 - 1.018) \times 5000 = 5.63 \times 5000 = 28150$
Cost: $28150 \div 1000 \times 0.75 = \21.11
Specific behaviours
✓ outer volume ✓ inner volume ✓ volume of all washers ✓ correct cost

Outer volume: $\pi \times 2.3^2 \times 0.4 = 6.648$

cm vs mm

Inner volume: $\pi \times 0.9^2 \times 0.4 = 1.018$

Total volume: $(6.648 - 1.018) \times 5000 = 5.63 \times 5000 = 28150$

Cost: $28150 \div 1000 \times 0.75 = \21.11

 Specific behaviours |

✓ outer volume ✓ inner volume ✓ volume of all washers ✓ correct cost |

- (b) Calculate the total surface area of one washer, giving your answer in mm^2 . (4 marks)

Solution
Outer cylinder: $A_1 = 2\pi(23)^2 + 2\pi(23)(4) = 3902$
Inner circles: $A_2 = 2\pi(9)^2 = 509$
Inner walls: $A_3 = 2\pi(9)(4) = 226$
TSA: $A = 3902 - 509 + 226 = 3 619 \text{ mm}^2$
Specific behaviours
✓ outer cylinder ✓ inner circles ✓ inner walls ✓ correct TSA

Outer cylinder: $A_1 = 2\pi(23)^2 + 2\pi(23)(4) = 3902$

Add or subtract

Inner circles: $A_2 = 2\pi(9)^2 = 509$

23 vs 32

Inner walls: $A_3 = 2\pi(9)(4) = 226$

TSA: $A = 3902 - 509 + 226 = 3 619 \text{ mm}^2$

 Specific behaviours |

✓ outer cylinder ✓ inner circles ✓ inner walls ✓ correct TSA |

Supplementary page

Question number: _____

Supplementary page

Question number: _____

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