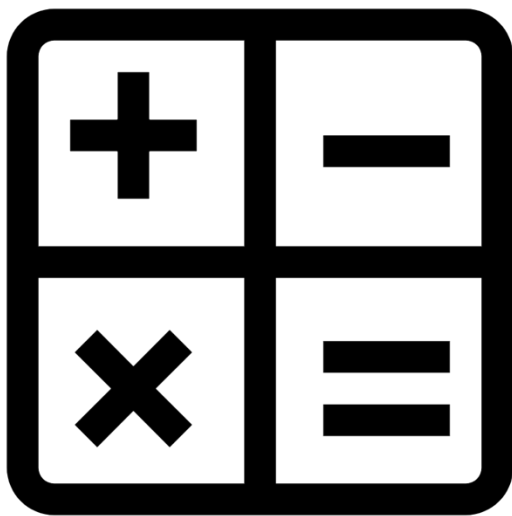




Department of  
Education

# Year 12 ATAR Accounting and Finance

## Unit 3: Cost-Volume-Profit



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# Year 12 ATAR Accounting and Finance

## Unit 3

### Topic: Cost-Volume-Profit

#### OVERVIEW

The aim of providing resources for Year 12 Accounting and Finance students is to assist students to revise and prepare for Semester 1 Examinations. Additionally, these resources are designed to supplement (not replace) your classroom teacher's programme.

The following format applies to this booklet:

#### **Section 1: Syllabus requirements**

Please familiarise yourself with the syllabus requirements for each topic. Including links to the SCSA website for important curriculum documents. You will need to access the 2020 Specifications Booklet. Click this link to download a copy of the booklet: [https://senior-secondary.scsa.wa.edu.au/data/assets/pdf\\_file/0012/593895/2020\\_ACF\\_Specification\\_Booklet.PDF](https://senior-secondary.scsa.wa.edu.au/data/assets/pdf_file/0012/593895/2020_ACF_Specification_Booklet.PDF)

#### **Section 2: Theory Content**

Read through this section, taking notes and highlighting important concepts. Also included in this section are links to various videos to assist in your understanding of the topics.

#### **Section 3: Activities**

Various questions based on the topic content. Each question is followed by the suggested solution. This section includes ATAR Exam questions from previous years.

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## Section 1: Syllabus content covered

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### ***Financial Institutions and systems***

#### ***Financial systems and fundamental principles***

- Explain the relationship between volume of activity, costs and profit.

#### ***Recording, using and evaluating financial information***

#### ***Recording, processing and communicating financial information***

- Cost-volume-profit (CVP) processing for a single and multi-product (maximum three products) business
  - Calculation of contribution margin
  - Calculation of contribution margin per unit
  - Calculation of weighted average contribution per unit
  - Calculation of margin of safety
  - Calculation of selling price, variable cost, fixed cost, profit or sales volume
  - Calculation of break-even point
  - Calculation of the effect on profit/loss of make or buy decisions
  - Calculation of the effect on profit/loss of closing a department/dropping a segment product decision
  - Calculation of the gain or loss on special order decisions

#### ***Evaluating financial information for planning, coordinating, controlling and investing***

- Cost-volume-profit (CVP) analysis for decision making purposes.
  - Cost behaviour
  - Contribution margin
  - Break-even point
  - Margin of safety
- Interpretation of CVP results and testing of sensitivity to changing decisions about:
  - Volumes, product mixes, pricing and costs and the impact of capacity constraints
  - Make or buy decisions
  - Close down product/business unit decisions
  - Accept or reject special orders decisions

### **You can find other important Accounting and Finance Course Information at:**

<https://senior-secondary.scsa.wa.edu.au/syllabus-and-support-materials/humanities-and-social-sciences/accounting-and-finance>

### **The 2020 Accounting and Finance Specifications Booklet contains important formulas required for this topic:**

[https://senior-secondary.scsa.wa.edu.au/data/assets/pdf\\_file/0012/593895/2020\\_ACF\\_Specification\\_Booklet.PDF](https://senior-secondary.scsa.wa.edu.au/data/assets/pdf_file/0012/593895/2020_ACF_Specification_Booklet.PDF)

# Topic: Cost-Volume-Profit

## Section 2: Reading and Note Taking Section

- *Section 2: The following pages will outline the theory components of this topic.*
- *Please take time to read through this information, taking notes and highlighting important concepts.*
- *Then move on to Section 3: Activities Section for activities and exam style questions.*

### Cost-Volume-Profit Introduction

Business owners and managers make decisions about how to run businesses and make a profit. Their decisions impact on the profitability of the business.

One aspect of business decision-making is the relationship between cost, volume and profit. Using cost-volume-profit calculations the short-term effect of changes to a business such as a new manufacturing process, cost management or changes to the unit price are analysed.

Business opportunities and proposals, such as a new product or opening a new shop, can be assessed in terms of their impact on future profitability and compared to alternatives.

A clothing manufacturer will use cost-volume-profit calculations to model the effect on profit of launching a new garment or using more expensive material.

If costs increase, the manufacturer is able to calculate what would happen to profit if the sale price is increased and how many garments must be sold to cover the new costs.

### The relationship between cost, volume and profit

One of the issues that business owners constantly face is making short-term decisions concerning sale prices, sales and production volumes and costs.

The combination of these will affect profit and therefore the knowledge of cost, volume and profit is crucial to successful business management.

Cost-volume-profit analysis examines the relationship between three measures of business activity, costs, volume and profit. Volume is the quantity and value of goods and services sold. For example, 12 000 songs downloaded, \$150 000 of adjustable wrenches sold or 10 000 cars off the assembly line.

Cost-volume-profit (CVP) involves the following components:

- Volume of Sales
- Variable Costs
- Unit Selling Price
- Total Fixed Costs

The following assumptions are made when using CVP analysis:

1. All costs can be classified as variable or fixed.
2. Unit sale prices remains constant.
3. Total fixed costs remain constant.
4. Activity and efficiency remain constant.
5. Variable costs change in proportion with the level of sales.

Sales, costs and profit can be used in the following equation:

$$\begin{aligned} \text{sales} &= \text{variable costs} + \text{fixed costs} + \text{profit} \\ \text{or} \\ \text{profit} &= \text{sales} - \text{variable costs} - \text{fixed costs.} \end{aligned}$$

### Uses of cost-volume-profit

The level of profit should be continuously evaluated over any given period. In order to do this business owners must use:

1. the unit selling price of each product
2. the variable costs such as labour
3. and materials that are used to produce and sell the product
4. and the total fixed costs.

This information is combined with the volume of sales to answer such questions as:

1. What is the break-even point? What level of sales does the business need to reach before profit can be made?
2. What will be the impact of increasing variable costs such as advertising?
3. If the unit selling price is increased or decreased, what will be the effect on sales?
4. Should the business accept or reject a special order?
5. What would be the impact of increased fixed costs due to external influences? (For example, suppliers raising prices.)
6. What mix of products should the business sell?

### Cost behaviour

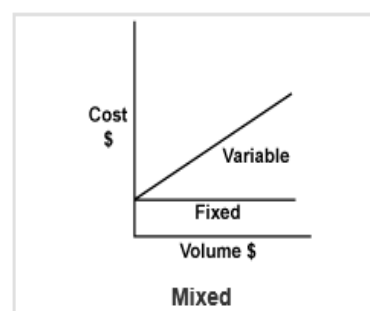
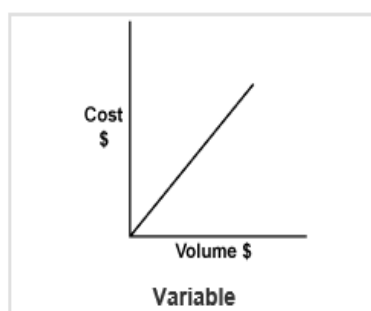
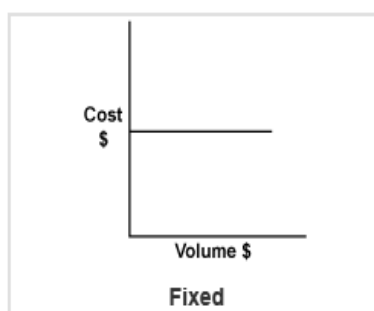
Cost behaviour refers to how a cost changes over an accounting period. This unit examines three types of cost behaviour:

1. variable
2. fixed
3. and mixed.

Cost behaviour is determined by the relationship between volume and cost. If there is a direct relationship between costs and volume, costs are variable. If cost and volume are independent, costs are fixed.

The three types of cost behaviour are detailed in the table below.

Cost behaviour	Explanation	Examples
Fixed	Fixed costs are constant over a period at all levels of business activity.	Rent, insurance, salaries, depreciation, interest on loans.
Variable	Variable costs change over the period as business activity changes. An increase in production or sales will result in an increase in variable costs.	Direct materials and direct labour increase as production increases. Supplies costs such as fuel, stationery and parts.
Mixed	Mixed costs have a fixed base and an amount that is dependent on business activity.	Telephone – fixed line rental and variable usage costs. Hire vehicle – fixed rental payments plus variable usage costs. Sales staff – a fixed base salary plus commission on sales.



### Contribution margin

Contribution margin is the amount left over after subtracting the variable costs from the sales. The contribution margin shows how much sales income is left over to contribute towards fixed costs and profit.

The contribution margin can be based on total sales and total variable costs or on a product basis using the unit sale price and unit variable cost.

The formula to calculate the contribution margin is:

$$\text{contribution margin} = \text{sales less variable costs}$$

or

$$\text{contribution margin} = \text{selling price per unit less variable costs per unit.}$$

For example, if a clothing manufacturer makes \$80 000 in sales and variable costs are \$25 000 the contribution margin can be calculated as follows.

$$\text{contribution margin} = 80\,000 \text{ less } 25\,000 = \$55\,000$$

This means the manufacturer has \$55 000 left to pay for fixed costs and make a profit.

For example, if the sale price is \$10 per unit and variable costs are \$3 per unit the contribution margin is  $\$10 - \$3 = \$7$ . This shows that each product contributes \$7 towards fixed costs and profit.

If the sales figure is \$200 000 and variable costs are \$50 000 the contribution margin is \$150 000 ( $\$200\,000 - \$50\,000 = \$150\,000$ ). From sales there is \$150 000 available for fixed costs and profit.

### Break-even point

A critical part of financial planning is conducting a break-even analysis. This is an analysis of the relationship between sales and costs. A break-even analysis is used to determine how many products or services need to be sold and at what price before a profit can be made.

Airlines use the break-even point on every flight to work out how many discounted seats they can offer. Airlines calculate how many seats need to be sold at full price to cover the flight costs such as fuel, wages and catering. Once this break-even number of seats have been sold, the airlines can offer the remaining seats at a discount.

The first step of break-even analysis is classifying costs into fixed and variable. Because fixed costs have to be met regardless of sales volume, the business must operate at a loss until a certain volume of sales has been reached.

The break-even point is the point at which there is neither a profit nor a loss; total sales are equal to total costs. To make a profit, a business must earn income above this point.



For example, a business sells its products for \$10 each and has identified the following cost information.

Costs	\$
Direct materials	3
Direct labour	1
Rent	1 000
Utilities	500

### Break-even point: Profit Equation

Profit is equal to sales less total costs. At the break-even point, profit is zero, which means total sales is equal to total costs:

$$\text{profit} = \text{sales} - (\text{variable costs} + \text{fixed costs})$$

$$0 = \text{sales} - (\text{variable costs} + \text{fixed costs})$$

$$\text{sales} = \text{variable costs} + \text{fixed costs}$$

Let's use 'A' for the volume of sales. If 'A' is the number of units sold, sales will equal the unit price multiplied by 'A' and variable costs will equal the unit cost multiplied by 'A'. So the equation above can be restated as:

$$\text{Sales} = \text{variable costs} + \text{fixed costs}$$

$$\text{unit price} \times A = \text{unit cost} \times A + \text{fixed costs}$$

$$\text{unit price} \times A - \text{unit cost} \times A = \text{fixed costs}$$

$$(\text{unit price} - \text{unit cost}) \times A = \text{fixed costs}$$

$$A = \text{fixed costs} \div (\text{unit price} - \text{unit cost})$$

'A' is the number of units the business must sell to break even. If we multiply A by the unit price it will give us the break-even sales in dollars.

For example, the selling price for a magazine is \$8.99. Raw material costs are \$1.50 and labour costs are \$2.80 per magazine. Fixed costs are \$2 000.

$$\text{Sales} = \text{variable costs} + \text{fixed costs}$$

$$8.99 \times A = (1.50 + 2.80) \times A + 2\,000$$

$$8.99A - 4.30 \times A = 2\,000$$

$$4.69 \times A = 2\,000$$

$$A = 2\,000 \div 4.69$$

$$A = 427$$

This shows that the business must sell 427 units to break even. The business can't sell fractions of products so the result is rounded up.

We know that 'unit price – unit cost' is the contribution margin. So the equation can be restated as:

$$\text{Breakeven point} = \text{fixed costs} \div \text{contribution margin}$$

### Break-even Point: Contribution

Break-even point using the contribution

**Step 1** Identify and classify costs as fixed and variable.

**Step 2** Calculate the contribution margin (CM).

$$\text{CM} = \text{unit price} - \text{unit variable cost}$$

$$= \$10 - \$4$$

$$= \$6 \text{ per unit}$$

**Step 3** Calculate the break-even point in units using the following formula:

$$\text{breakeven point} = \text{fixed costs} \div \text{CM}$$

$$= 1\,500 \div 6$$

$$= 250$$

The business must sell 250 products to reach the break-even point, just to cover costs.

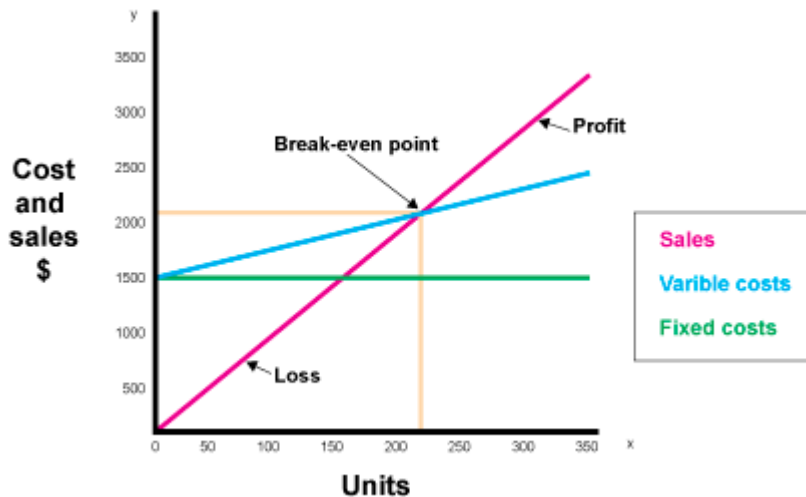
In dollar terms the business must earn \$2500 (250 x \$10) to break even.

If the business sells more than 250 products, profit will be made, if less than 250 are sold, the business will make a loss.

## Break-Even Point: Graph

Break-even point analysis can also be done with a graph. Because the graph shows costs, volume and profits it is referred to as the cost-volume-profit graph. To do this, total costs and sales are plotted on the y-axis in dollars against the number of units on the x-axis.

The point where the sales and total costs lines intersect is the break-even point. An example is shown below.



From the graph you can see the break-even number of units is 250 and the business must make \$2500 in sales to break even.

## Margin of safety

Margin of safety is the amount by which budgeted or actual sales exceed the break-even point sales. It shows how far sales can decrease before a loss occurs. This buffer is the margin of safety. The margin of safety can be expressed in dollars or units.

For example, a sporting goods business expects to sell 20 000 hockey balls at \$10 each. The break-even point is 12 000 balls.

$$\begin{aligned}\text{Margin of safety} &= \text{total sales} - \text{break-even sales} \\ &= 20\,000 - 12\,000 \\ &= 8000\end{aligned}$$

This means that the margin of safety is 8000 balls or \$80 000.

The margin of safety is important when considering a reduction in the selling price for a sale. The margin of safety will indicate how low the price can go. The contribution margin will decrease but the aim is to generate a higher sales volume and increased profit because of the discounted price.

## Cost-volume-profit analysis and interpretation

Cost-volume-profit interpretation is a short-term decision-making tool that assists managers in understanding the behaviour of total costs, income and profit as changes occur in:

1. production volume
2. sales volume
3. selling prices
4. variable costs
5. fixed costs.

The analysis shows the impact on profit and tests how sensitive profit is to changes in selling prices, sales volume, costs and product mix.

### Changes to prices and costs

When business owners and managers make decisions about managing costs and changing prices they conduct cost-volume-profit analysis. A business may be planning a sale to increase costs. The cut in unit price will decrease the contribution margin and the break-even point will be higher.

If the price is lower the business will have to sell more to cover costs. Fixed costs will increase if the business pays for an advertising campaign to promote the sale. Looking at the margin of safety will indicate how big the discounts can be.

### Product and business mix

To maximise profits a business can review the products it sells. If cost-volume-profit analysis shows that a product is unprofitable the business may decide to drop the product or replace it with one that will sell more. Analysis will compare the contribution margins, margins of safety and break-even points of products.

The same analysis can be done on business units. For example, a music and fashion shop may also have an online shop. Cost-volume-profit analysis will compare the shop to the online business. The analysis may find that not enough people use the online shop for it to be profitable. The decision then is to try and build it or close it down.

### Special Orders

When a product is manufactured, costs arise from purchasing raw materials and in labour costs to set up and run the manufacturing process. These set-up costs are high in the beginning but once the process is underway costs fall as production becomes more efficient.

If a customer requests a special order or modifications to the standard product, these set up costs are incurred again as materials are purchased and the production process is interrupted. The standard costs set in the budget may not be achieved because of the additional costs incurred by filling the special order. It may be the case that the additional costs to make the special order result in it being unprofitable.

A customer may request additional chairs for a dining suite, a change to the style of table legs or a different type of wood. Cost-volume-profit analysis is used to decide whether it is worthwhile for a business to accept a special order.

### Example

Sports WA makes club jerseys for the local junior hockey teams. The unit price is \$20. Plain jerseys are purchased for \$12 each and at a cost of \$3 per jersey the club logo and name are added. Sports WA makes 2000 jerseys per year. The fixed cost of the embroidery process is \$8000 which means that the fixed cost per jersey is \$4 (\$8000/2000 jerseys). A salesperson has negotiated an order from a new customer of 100 jerseys at a price of \$20 per jersey. The salesperson offered the lower price to secure the new business. The sales manager is not happy about the order because it is lower than the set \$22 price.

The first impression is that it is not a good deal because of the lower price but the salesperson showed the following cost analysis.

Standard costing		Special order	
Sale price	\$22	Special offer price	\$20
Variable costs:		Variable costs:	
Jersey	\$12	Jersey	\$12
Embroidery	\$3	Embroidery	\$3
Fixed costs per jersey	\$4		
Profit per jersey	\$3	Profit per jersey	\$5
		Number of jerseys	100
		Increase in profit	\$500
	Contribution margin \$22 - \$15 = \$7		Contribution margin \$20 - \$15 = \$5

The company should accept the special order. Although the contribution margin of the special order is lower it will bring in an additional \$500 profit.

### Make or buy

Cost-volume-profit analysis is used when deciding to manufacture or buy a part or product. Making the part or product will give a business control over quality, costs and price. Buying the part or product is simpler, but the business has little control over costs or quality. Cost-volume-profit analysis compares the costs expected from making a part or product to the costs of buying the part or product.

For example, a furniture manufacturer will compare producing their own handles or buying handles from a supplier; or an airline will compare producing their own meals for passengers to contracting a supplier to produce the meals.

For the next month Promotions Ltd needs to have a stock of 3000 t-shirts. In the past the products have been made by Promotions Ltd at a cost of \$12 and sold for \$20. Recently a supplier has offered ready-made t-shirts at \$10 each. To decide whether to make the t-shirts themselves or to buy them from a supplier, the offer is compared to the company's future costs of manufacturing the 3000 units.

Costs of manufacturing the units:

<b>Direct material per unit</b>	\$4.00
<b>Direct labour per unit</b>	\$6.00
<b>Variable overhead</b>	\$1.00
<b>Fixed overhead</b>	\$1.00
<b>Total production per unit cost</b>	\$12.00

If Promotion Ltd buys the t-shirts from the supplier the purchase price will include a charge for delivery and freight insurance of \$1000. The company will have to pay the fixed overhead regardless of whether the products are purchased or made so the cost comparison is based on the difference between the variable costs.

Should Promotions Ltd make or buy the t-shirts?

Buy from a supplier	Make the units	
Future cost of 3 000 units	Direct material	\$4
3 000 x \$10 = \$30 000	+ direct labour	\$6
plus delivery and insurance \$1 000	+ variable overhead	\$1
Total cost = \$31 000	Total	\$11
	3 000 x \$11 = \$33 000	
	Total cost = \$33 000	

It is better to buy the products from the supplier. There is a cost saving of \$2000 and the contribution margin is slightly higher.

The contribution margin is \$9 (\$20 – \$11 = \$9) if the company makes the products. If the products are purchased the contribution margin is:

$$\begin{aligned}
 \text{contribution margin} &= \text{unit price} - \text{unit variable costs} \\
 &= \$20 - (\$31\,000/3000) \\
 &= \$20 - \$10.33 \\
 &= \$9.67
 \end{aligned}$$

The unit variable costs are calculated by dividing the total cost of \$31 000 by the number of units, 3000.

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### Section 3: Activities Section

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- *This section includes activities and exam style questions relevant to this topic.*
  - *The solutions are included after each question.*
  - *Attempt the question and then use the solution to assess your performance and revise.*
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#### Question 1

A clothing manufacturer has sales of \$80 000, variable costs are \$25 000 and profit is \$20 000.

Rearrange the following equation to calculate fixed costs.

sales = variable costs + fixed costs + profit

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**Question 1 Solution**

sales = variable costs + fixed costs + profit

$$80\,000 = 25\,000 + fc + 20\,000$$

$$80\,000 = 45\,000 + fc$$

$$\text{Fixed costs} = \$35\,000$$

**Question 2**

Calculate the missing amounts in the table below:

Unit selling price	Unit variable costs	Contribution margin per unit
\$300	\$250	
\$1000		\$240
	\$180	\$640

**Question 2 Solution**

Unit selling price	Unit variable costs	Contribution margin per unit
\$300	\$250	\$50
\$1000	\$760	\$240
\$820	\$180	\$640

**Question 3**

What price should a product be sold at (its unit price) to achieve a contribution margin of \$6 if variable costs are \$3 per unit?

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**Question 3 Solution**

Contribution margin = unit price (UP) – variable costs

$$\$6 = \text{UP} - \$3$$

$$\text{UP} = \$9$$

The correct answer is: \$ 9

**Question 4**

Look at the following cost information and answer the questions below.

Sales revenue	\$100 000
Total variable costs	\$70 000
Total fixed costs	\$15 000
Unit selling price	\$10
Variable costs per unit	\$7

(a) What is the contribution margin per unit?

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(b) What is the contribution margin based on total sales?

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(c) How much will the contribution margin be if 500 units are sold?

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**Question 4 Solutions**

(a) Contribution margin per unit

$$= \$10 - \$7$$

$$= \$3$$

The correct answer is: \$ 3

(b) Contribution margin based on total sales

$$= \$100\,000 - \$70\,000$$

$$= \$30\,000$$

The correct answer is: \$ 30000

(c) Contribution margin of 500 units

$$= \$500 \times \$3$$

$$= \$1\,500$$

The correct answer is: \$ 1 500

**Question 5**

The following cost information has been identified.

Unit price	\$1 000
Direct materials	\$150 per unit
Direct labour	\$80 per unit
Overheads	\$60 per machine hour
Machine time	30 minutes per unit
Insurance	\$25 000
Administration	\$75 000
Selling and distribution	\$100 000

(a) What are the total variable costs?

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(b) What are the total fixed costs?

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(c) Calculate the break-even point.

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**Question 5 Solution**

(a) What are the total variable costs?

$$= \$150 + \$80 + \$30$$

$$= \$260$$

The correct answer is: \$ 260

(b) What are the total fixed costs?

$$= \$25\,000 + \$75\,000 + 100\,000$$

$$= \$200\,000$$

The correct answer is: \$ 200 000

(c) Calculate the break-even point.

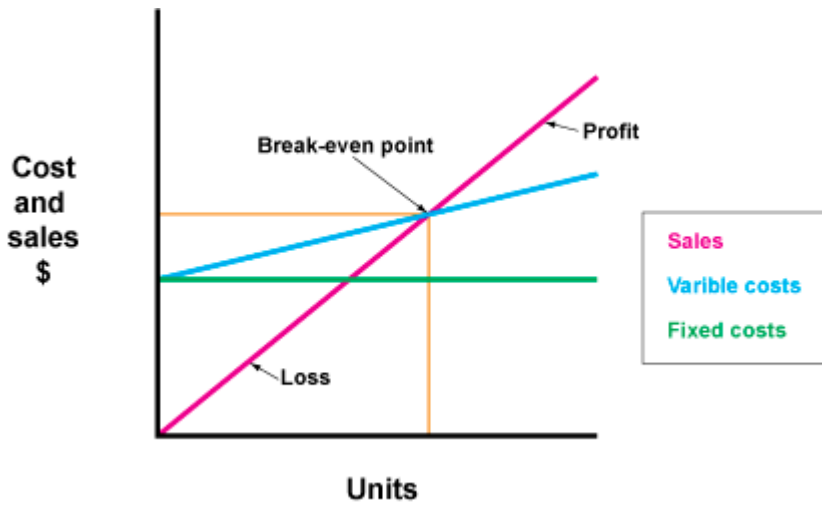
$$\text{break-even point} = \text{fixed costs} \div \text{contribution margin}$$

$$= 200\,000 \div (1\,000 - 260)$$

$$= 270 \text{ units}$$

The correct answer is: 270 units

**Question 6**



Refer to the break-even graph above to answer the following questions

- (a) What would happen to the graph if fixed costs increased? Would the break-even point be higher or lower?

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- (b) What would happen to the graph if variable costs decreased? Would the break-even point be higher or lower?

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(c) What would happen to the graph if the unit selling price was decreased? Would discounts during a sale make the break-even point higher or lower?

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**Question 6 Solution**

- (a) The fixed costs line would be higher so the total cost line would be higher. The break-even point would also be higher.
- (b) The variable cost line would be flatter and the break-even point would be lower.
- (c) The sales line would be flatter. The break-even point would be higher. The business will need to sell more to break even with discounts.

**Question 7**

The selling price for a shirt is \$28. Raw material costs are \$6.50 and labour costs are \$9.50 per magazine. Fixed costs are \$4000. Calculate the break-even point in units and dollars. What is the contribution margin (CM)?

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**Question 7 Solution**

$$\begin{aligned} \text{CM} &= \$28 - (\$6.50 + \$9.50) = \$28 - (\$16.00) = \$12 \\ \text{Break-even point} &= \$4\,000 \div \$12 = 333 \text{ units} \\ &6 \times 1\,900 = \$9\,324 \end{aligned}$$

The correct answer is: \$ 9 324

**Question 8**

A dining suite is manufactured with the following costs.

Raw materials	\$400
Labour	\$550
Varnish and screws	\$50
Workshop fixed costs	\$5 400

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**Question 8 Solution**

The suite sells for \$1 900. Calculate the contribution margin and break-even point in units and dollars.

$$\text{CM} = \$1\,900 (\$400 + \$550 + \$50) = \$1900 - \$1000 = \$900$$

$$\text{Break-even point} = \text{fixed costs} \div \text{CM} = 5\,400 \div 900 = 6 \text{ units}$$

$$6 \times 1900 = \$11\,400$$

The correct answer is: \$ 11400



**Question 9**

Gizmo Ltd manufactures computer components. Variable costs per unit are \$9. Fixed costs are \$6500. The computer components sell for \$14. Actual sales for the period were 1500 units.

(a) Calculate the contribution margin.

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(b) Calculate the break-even point.

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(c) Calculate the margin of safety.

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**Question 9 Solution**

(a)  $CM = \$14 - \$9 = \$5$

The correct answer is: \$ 5

(b) Break-even point

= fixed costs  $\div$  CM

= \$6 500  $\div$  \$5

= 1300 units

The correct answer is: 1300 units

(c) Margin of safety

= total sales – break-even sales

= 1500 – 1300

= 200 units

The correct answer is: 200 units

**Question 10**

A company manufactures portable music players. You have been given the following information.

	Total \$	Per unit
Actual sales	\$1 200 000	\$60
Variable costs	\$900 000	\$45
Fixed costs	\$240 000	

(a) Calculate the contribution margin.

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(b) Calculate the break-even point using the profit equation method

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(c) Calculate the margin of safety.

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(d) Express the break-even point and margin of safety in dollars and units

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**Question 10 Solution**

(a) CM  
= \$60 – \$45  
= \$15

The correct answer is: \$ 15

(b) Break-even point is when profit is zero and sales equals total costs

$$\text{Profit} = \text{sales} - (\text{fixed costs} + \text{variable costs})$$

$$\text{Sales} = \text{fixed costs} + \text{variable costs}$$

$$\text{Unit price} \times A = 240\,000 + \text{unit cost} \times A$$

$$(\text{unit price} - \text{unit cost}) \times A = 240\,000$$

$$(60 - 45) \times A = 240\,000$$

$$A = 240\,000 \div 15 = 16\,000 \text{ music players,}$$

$$16\,000 \times \$60 = \$960\,000$$

The correct answer is: \$ 960 000

(c) Margin of safety

$$= \text{total sales} - \text{break-even sales}$$

$$= (1\,200\,000 \div 60) - 16\,000$$

$$= 20\,000 - 16\,000$$

$$= 4\,000 \text{ units}$$

The correct answer is: 4000 units

(d) \$1 200 000 – \$960 000  
= \$24 000 or 4000 music players

**Question 11 (33 marks)**

New Skate of Mind manufactures skateboards. The owner has provided you with the following information relating to the two most popular skateboards they manufacture:

- cruiser
- longboard.

The following information relates to the planned production and sale of the two skateboards.

	<b>Cruiser</b>	<b>Longboard</b>
Selling price per skateboard	\$180	\$240
Variable expenses per skateboard	\$70	\$100
Sales volume in units per year	3,600	2,400
Number of machine hours required to make each skateboard	5 hours per unit	7 hours per unit

Fixed costs are \$170,800 per year.

- (a) Calculate the budgeted contribution margin per unit for the cruiser and the longboard. (4 marks)

Workings:

Cruiser budgeted contribution margin per unit: \_\_\_\_\_

Longboard budgeted contribution margin per unit: \_\_\_\_\_

Source: School Curriculum and Standards Authority, Accounting and Finance 2018 ATAR Examination

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(b) Calculate the number of units required to be sold of each product in order to breakeven.

(12 marks)

Workings:

Cruiser break-even units: \_\_\_\_\_

Longboard break-even units: \_\_\_\_\_

Source: School Curriculum and Standards Authority, Accounting and Finance 2018 ATAR Examination

[https://senior-secondary.scsa.wa.edu.au/\\_data/assets/pdf\\_file/0008/542960/2018\\_ACF\\_Written\\_Examination\\_Web-version.PDF](https://senior-secondary.scsa.wa.edu.au/_data/assets/pdf_file/0008/542960/2018_ACF_Written_Examination_Web-version.PDF)

- (c) New Skate of Mind has been approached by Mystic Sk8 to make a special order of 500 shortboards at a price of \$200 each.  
 These boards will be required to be branded with the Mystic Sk8 logo.  
 The costs for the special order would be same as those of the longboard skateboards but New Skate of Mind would need to buy in a special piece of equipment costing \$4,000 to put the logo onto the special order.
- (i) Calculate the total profit for New Skate of Mind before accepting the special order. (5 marks)

Workings:

Total profit before special order: \_\_\_\_\_

- (ii) Due to capacity constraints, in order to accept the special order New Skate of Mind will have to forego some production in either the cruiser or the longboard. Outline how the business will determine which of these two skateboards will have its production levels reduced. (2 marks)

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Source: School Curriculum and Standards Authority, Accounting and Finance 2018 ATAR Examination  
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(iii) New Skate of Mind has determined that in order to accept the special order it will reduce production of the longboard by 400 units. Calculate the gain or loss on the special order. (8 marks)

Workings:

Gain/loss (circle whichever is correct) on the special order: \_\_\_\_\_

(d) Describe how break-even analysis can assist New Skate of Mind in the decision-making process. (2 marks)

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**Question 11 Solutions****(33 marks)**

- (a) Calculate the budgeted contribution margin per unit for the cruiser and the longboard.  
(4 marks)

Workings	Marks
CM = SP – VC	
Cruiser: $180 \text{ (1)} - 70 \text{ (1)} = 110$	1–2
Longboard: $240 \text{ (1)} - 100 \text{ (1)} = 140$	1–2
<b>Total</b>	<b>4</b>
Cruiser budgeted contribution margin per unit: \$110 Longboard budgeted contribution margin per unit: \$140	

Deduct 1 mark for each calculation error and/or inclusion of foreign items, to a maximum of 1 mark.

- (b) Calculate the number of units required to be sold of each product in order to break even.  
(12 marks)

Workings	Marks
Weighted average contribution margin (WACM) = $\frac{\sum (\text{contribution margin per unit} \times \text{sales mix}\%)}{\text{TFC}}$ Break-even = $\frac{\text{WACM}}{\text{WACM}}$	
Total sales = 3,600 (Cruiser) + 2,400 (Longboard) = 6,000 (1)	1
Sales Mix: Cruiser = $\frac{3,600 \text{ (1)}}{6,000} = 60\%$	1
Sales Mix: Longboard = $\frac{2,400 \text{ (1)}}{6,000} = 40\%$	1
Weighted average contribution margin = $[(110 \text{ (1)} \times 60\% \text{ (1)}) + (140 \text{ (1)} \times 40\% \text{ (1)})]$ = $66 + 56 = 122$	1–4
Break-even = $\frac{170,800 \text{ (1)}}{122 \text{ (1)}}$	1–2
Cruiser break-even = $*1,400 \text{ (1)} \times 60\% \text{ (1)} = 840$	1–2
Longboard break-even = $*1,400 \times 40\% \text{ (1)} = 560$ *1 mark awarded once only for total sales of 1,400	1
<b>Total</b>	<b>12</b>
Cruiser break-even units: 840 Longboard break-even units: 560	

Deduct 1 mark for each calculation error, to a maximum of 1 mark.

- (c) (i) Calculate the total profit for New Skate of Mind before accepting the special order. (5 marks)

Workings	Marks
Total revenue: Cruiser: 3,600 x 180 = 648,000 <b>(1)</b> Longboard: 2,400 x 240 = <u>576,000</u> <b>(1)</b> 1,224,000	1–2
Variable costs: Cruiser: 3,600 x 70 = 252,000 <b>(1)</b> Longboard: 2,400 x 100 = <u>240,000</u> <b>(1)</b> 492,000 Fixed costs: 170,800 <b>(1)</b>	1–3
Profit = Total revenue – total costs = 1,224,000 – 492,000 – 170,800 = 561,200	
<b>Total</b>	<b>5</b>
Total profit before accepting the special order: \$561,200	

Deduct 1 mark for calculation error in total profit.

- (ii) Due to capacity constraints, in order to accept the special order New Skate of Mind will have to forego some production in either the cruiser or the longboard. Outline how the business will determine which of these two skateboards will have its production levels reduced. (2 marks)

Description	Marks
Outlines how the business will determine which skateboard will have its production levels reduced	2
Identifies how the business will determine which skateboard will have its production levels reduced	1
<b>Total</b>	<b>2</b>
Answers could include:  The business will need to compare the contribution margin of each skateboard per limited resource (e.g. machine hours). The skateboard with the lowest result is that which should have its production reduced.	

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(iii) New Skate of Mind has determined that in order to accept the special order it will reduce production of the longboard by 400 units. Calculate the gain or loss on the special order. (8 marks)

Workings	Marks
Gain/loss = (SP x QS) – (VC x QS) – new FC – OC	
Opportunity costs = units forgone x usual CM longboard = (500 – 100) x 140 = 400 (1) x 140 (1) = 56,000	1–2
Gain/loss = (500 (1) x 200 (1)) – (500 (1) x 100 (1)) – 4,000 (1) – 56,000 = 100,000 – 50,000 – 4,000 – 56,000 = (10,000) loss (1)	1–6
<b>Total</b>	<b>8</b>
Loss on the special order: \$10,000	

Deduct 1 mark for each calculation error, to a maximum of 1 mark. Deduct 1 mark for inclusion of foreign items, to a maximum of 1 mark.

(d) Describe how break-even analysis can assist New Skate of Mind in the decision-making process. (2 marks)

Description	Marks
Describes how break-even analysis can assist New Skate of Mind in the decision-making process.	2
Makes a general statement about break-even analysis	1
<b>Total</b>	<b>2</b>
Answer(s) could include but are not limited to:  Break-even analysis: <ul style="list-style-type: none"> <li>• allows managers to ascertain at what volume of production it will cover all of its fixed and variable costs</li> <li>• can assist managers to make informed decisions when evaluating short-term alternatives and plans.</li> </ul>	
Accept any other reasonable answer.	

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**Question 12**

GreenMatt Ltd is a Perth-based eco-friendly business that installs premium quality synthetic grass for its residential clients. The company charges its clients a flat fee of \$110.00 per square metre of synthetic grass actually installed. Currently, GreenMatt has a maximum monthly installation capacity of 7000 square metres.

Over the past six months, GreenMatt has installed an average of 5000 square metres of synthetic grass per month. Given that the process used by GreenMatt for installing synthetic grass is a highly-standardised one, the business has identified the following standard costs per square metre installed:

Direct material	\$20.00	per square metre.
Direct labour cost	\$30.00	per square metre.
Direct variable costs	\$35.00	per square metre.

The budgeted break-even point per month requires 3000 square metres of synthetic grass to be installed.

(a) Complete the following for GreenMatt’s management.

(i) Explain how management might use cost-volume-profit analysis for decision-making purposes. (3 marks)

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- (ii) Explain what is meant by the term 'margin of safety'. (2 marks)

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- (b) Calculate the contribution margin per installed square metre. (4 marks)

Workings:

- (c) Calculate the total fixed costs per month. (2 marks)

Workings:

Total fixed costs per month: \_\_\_\_\_

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- (d) The owners of GreenMatt require a profit of \$40,000 per month.

GreenMatt's master budget for the month of December 2017 is based on 5000 square metres of synthetic grass being installed.

- (i) How many square metres of synthetic grass would have to be installed by GreenMatt to achieve the required target profit of \$40,000 for December 2017?

(3 marks)

Workings:

Budgeted square metres of synthetic grass to be installed to achieve the minimum budgeted profit target of \$40,000 per month: \_\_\_\_\_

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- (ii) Calculate the budgeted profit for the month ending 31 December 2017, on the master budget's basis of achieving the average installation of 5000 square metres for the month.  
(3 marks)

Workings:

Budgeted profit for the month ending 31 December 2017: \_\_\_\_\_

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[https://senior-secondary.scsa.wa.edu.au/data/assets/pdf\\_file/0009/458550/Accounting\\_and\\_Finance\\_Exam\\_2017.PDF](https://senior-secondary.scsa.wa.edu.au/data/assets/pdf_file/0009/458550/Accounting_and_Finance_Exam_2017.PDF)



- (e) The standard direct labour cost of \$30.00 is based on one direct labour hour persquare metre laid.

As a result of a shortage of direct labour, GreenMatt was only able to install 4000 square metres of synthetic grass during December 2017. In laying this quantity, the actual direct labour cost incurred was \$140,000 for the 4000 actual direct labour hours worked.

What was the amount of GreenMatt's total direct labour rate variance for December 2017? (5 marks)

Workings:

GreenMatt's total direct labour rate variance for December 2017: \_\_\_\_\_

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[https://senior-secondary.scsa.wa.edu.au/data/assets/pdf\\_file/0009/458550/Accounting\\_and\\_Finance\\_Exam\\_2017.PDF](https://senior-secondary.scsa.wa.edu.au/data/assets/pdf_file/0009/458550/Accounting_and_Finance_Exam_2017.PDF)

**Question 12 Solution**

- (a) (i) Explain how management might use cost-volume-profit analysis for decision-making purposes. (3 marks)

Description	Marks
Explains how CVP might be used for decision making	3
Provides a limited explanation about how CVP might be used for decision making	2
States a relevant fact about CVP	1
<b>Total</b>	<b>3</b>
<p>Answers could include:</p> <p>Cost-volume-profit (CVP) analysis enables decision-makers to assess how changes in selling prices, costs and volume impact upon the performance of a business.</p> <p>Uses of CVP analysis for decision-making include:</p> <ul style="list-style-type: none"> <li>• identification of the break-even point where the selling and variable costs per unit sold, product mix in a multi-product business and total fixed costs are known. The budgeted break-even point establishes the minimum number of sales required to neither make a profit nor a loss (i.e. net result = zero) and can reveal what margin of safety the business has with budgeted sales being above the break-even point</li> <li>• where budgeted profits are unlikely to be achieved, management is able to identify how, within the relevant range of activity, changes in selling prices and/or variable costs per unit, product mix and/or total fixed costs can be made to achieve a target profit</li> <li>• by revealing how profits are impacted by changes in selling prices and/or variable costs per unit, product mix and/or total fixed costs, management is able to analyse and identify which particular combination of these variables provides the optimal financial outcome for the business</li> <li>• facilitates the making of special decisions such as make or buy, accept a special order, close-down a product line or department. For example, if a business unit or department appears to be unprofitable and management believes that it ought to be closed, CVP analysis can be used to calculate the financial impact of a decision to shut down that business unit or department</li> <li>• where a constraint exists (e.g. resource inputs such as direct materials or direct labour) or manufacturing capacity (e.g. machine hours), management of a multi-product business is able to determine the optimal production mix decision for maximising business profits.</li> </ul> <p>Accept any other reasonable answer.</p>	

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- (a) (ii) Explain what is meant by the term 'margin of safety'. (2 marks)

Description	Marks
Explains margin of safety	2
States a fact about margin of safety	1
<b>Total</b>	<b>2</b>
<p>Answers could include:</p> <p>The margin of safety is the excess sales (measured in terms of units sold, sales revenue dollars or percentage), that the budgeted sales exceed break- even sales.</p> <p>For example, GreenMatt with an average monthly installation of 5000 square metres and a budgeted break-even point of 3000 square metres per month, the company would have a margin of safety of 2000 square metres.</p> <p>Accept any other reasonable answer.</p>	

- (b) Calculate the contribution margin per installed square metre. (4 marks)

Workings	Marks
CM = SP – VC	1–4
CM = 110(1) – (20(1) + 30(1) + 35(1))	
CM = \$25	
<b>Total</b>	<b>4</b>

Alternate workings

Workings	Marks	
Selling price per installed square metre	\$110	1
Less variable costs per installed square metre		
Direct material cost	(\$20)	1
Direct labour cost	(\$30)	1
Other variable expenses	(\$35) (\$85)	1
CM	\$25	
<b>Total</b>		<b>4</b>

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- (a) Calculate the total fixed costs per month. (2 marks)

Workings		Marks
Break-even point (in units)	$= \frac{\text{TFC}}{\text{CM per unit}}$	1–2
	$3,000(1) = \frac{\text{TFC}}{25(1)}$	
	$\$75,000 = \text{TFC}$	
<b>Total</b>		<b>2</b>

Alternate workings

Workings		Marks
Profit = (SP X QS) – [(VC X QS) + TFC]		1–2
At break-even, profit - zero:		
$0 = (110 \times 3,000) - (85 \times 3,000) - \text{TFC}$		
$\text{TFC} = (110 \times 3,000) (1) - (85 \times 3,000) (1)$		
$\text{TFC} = 330,000 - 225,000$		
$\text{TFC} = \$75,000$		
<b>Total</b>		<b>2</b>

- (b) (i) How many square metres of synthetic grass would have to be installed by GreenMatt to achieve the required target profit of \$40,000 for December 2017?
- 
- (3 marks)

Workings		Marks
Forecast target revenue	$= (\text{in units}) \frac{\text{TFC} + \text{Target Profit}}{\text{Contribution margin per unit}}$	1–3
	$= \frac{75,000(1) + 40,000(1)}{25(1)}$	
	$= 4600 \text{ square metres}$	
	$4600 \text{ square metres}$	
<b>Total</b>		<b>3</b>

Alternate workings

Workings		Marks
Profit	$= (\text{SP} \times \text{QS}) - [(\text{VC} \times \text{QS}) + \text{TFC}]$	1–3
40,000	$= (110 \times \text{QS}) - (85 \times \text{QS}) - 75,000$	
40,000 (1)	$= 25\text{QS} (1) - 75,000 (1)$	
115,000	$= 25 \text{QS}$	
4600	$= \text{QS}$	
<b>Total</b>		<b>3</b>

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(ii) Calculate the budget profit for the month ending 31 December 2017, on the master budget's basis of achieving the average installation for the month. (3 marks)

Workings	Marks
Profit = (SP X QS) – [(VC X QS) + TFC]	1–3
Profit = (110 x 5000) (1) – (85 x 5000) (1) – 75,000(1)	
Profit = 550,000 – 425,000 – 75,000	
Profit = \$50,000	
<b>Total</b>	<b>3</b>

(a) What was the amount GreenMatt's total direct labour rate variance for December 2017? (5 marks)

Workings:	Marks
Actual direct labour cost per direct labour hour worked:	
140,000(1) 4000(1) = \$35	1–2
Direct labour rate variance = (AR – SR) x ADLH	1–2
= (35 – 30(1)) x 4000(1)	
= 5 x 4000	
= \$20,000 Unfavourable(1)	1
<b>Total</b>	<b>5</b>

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### END OF CURRENT TOPIC

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