Foundation Mathematics Units 3 & 4

Chapter 11 — Business income, expenditure and the BAS

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Chapter 11 Business income, expenditure and the BAS — 11C Business revenue and planning

Theory

Running a small business is a mathematical activity: you take in money from sales and pay it out in costs, and the difference decides whether the business survives. This section looks at **revenue**, **costs**, **profit**, the **break-even point**, and how to plan a selling price so the business meets a target.

Revenue.

Revenue (or income) is the money a business takes in from sales. If each item sells for a price p and q items are sold, then

$$\text{revenue} = p \times q.$$

For example, selling 40 cakes at $\$12$ each gives a revenue of $12 \times 40 = \$480$.

Costs: fixed and variable.

A business has two kinds of costs.

- **Fixed costs** stay the same no matter how much is produced — rent, insurance, a market stall fee, equipment. They must be paid even if nothing is sold.
- **Variable costs** change with the number of items — materials, ingredients, packaging. If each item costs v to make, the variable cost of q items is $v \times q$.

The **total cost** is

$$\text{total cost} = \text{fixed cost} + v \times q.$$

Profit.

Profit is what is left after costs are paid (on the Foundation formula sheet):

$$\text{profit} = \text{income} - \text{expenditure} = \text{revenue} - \text{total cost}.$$

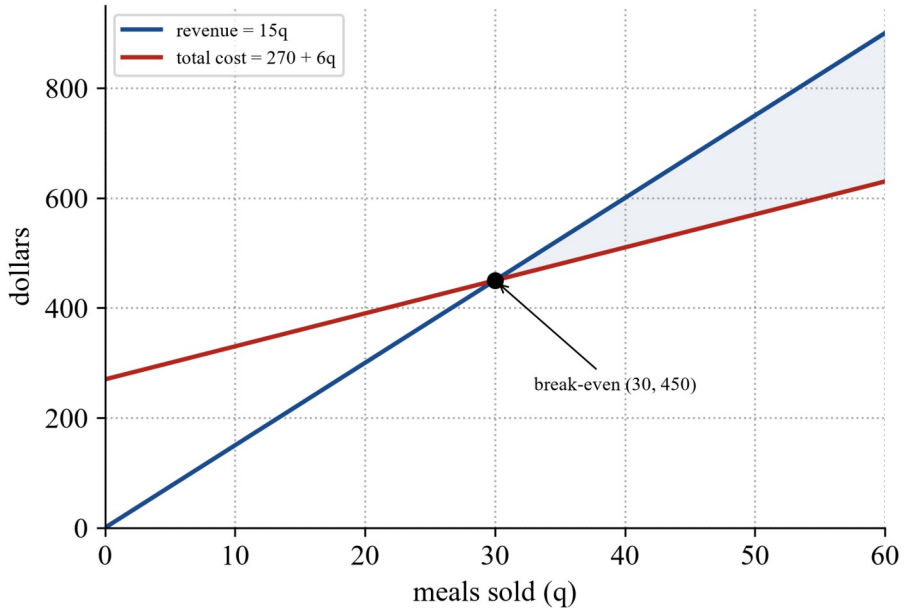
A **positive** profit means the business made money; a **negative** result is a **loss**.

The break-even point.

The **break-even point** is the number of items at which revenue exactly equals total cost, so the profit is zero. Each item sold contributes $p - v$ (its price minus its variable cost) toward the fixed costs — this is the **contribution** per item. The break-even quantity is

$$\text{break-even} = \frac{\text{fixed cost}}{p - v}.$$

Below the break-even quantity the business makes a loss; above it, a profit. If the break-even quantity is not a whole number, **round up** — you must sell whole items to *cover* the fixed costs.



The graph shows a cafe selling meals at $\$15$ with a variable cost of $\$6$ and fixed costs of $\$270$. The revenue and total-cost lines cross at 30 meals — the break-even point. To the right of it (shaded) the business is in profit.

Producing to a target profit.

To find how many items give a chosen **target profit**, add the target to the fixed cost before dividing by the contribution:

$$\text{units for a target profit} = \frac{\text{fixed cost} + \text{target profit}}{p - v}.$$

Mark-up and selling price.

A shop buys stock at a **cost price** and adds a **mark-up** (a percentage of the cost) to set the **selling price**:

$$\text{selling price} = \text{cost price} \times \left(1 + \frac{\text{mark-up}\,\%}{100}\right).$$

The profit on each item is the selling price minus the cost price. For example, a jacket bought for $\$40$ with a $60\,\%$ mark-up sells for $40 \times 1.60 = \$64$, a profit of $\$24$.

A simple business budget.

A **budget** lists expected income and expenses so the owner can plan. The bottom line is the expected profit or loss: total income minus total expenses. A good plan checks that the business can cover its fixed costs and reach break-even.

Worked examples

Example 1 — scaffolded

A stallholder sells hand-poured candles for $\$12$ each. The market stall costs $\$150$ for the day (a fixed cost) and each candle costs $\$4$ in wax and wicks. On one day 40 candles are sold. Find the revenue, the total cost and the profit.

Working	Comment
Revenue $= 12 \times 40 = \$480$.	Revenue \$= \$ price × quantity.
Variable cost $= 4 \times 40 = \$160$.	Each candle costs $\$4$ to make.
Total cost $= 150 + 160 = \$310$.	Total cost = fixed + variable.
Profit $= 480 - 310 = \$170$.	Profit = revenue − total cost.

Example 2 — scaffolded

For the same candle stall (price $\$12$, variable cost $\$4$, fixed cost $\$150$), find the break-even number of candles.

Working	Comment
Contribution per candle $= 12 - 4 = \$8$.	Each candle puts $\$8$ toward the fixed cost.
Break-even $= \dfrac{150}{8} = 18.75$ candles.	Break-even $= \dfrac{\text{fixed cost}}{p - v}$.
Round **up** to 19 candles.	Whole candles only, and 18 would not yet cover the $\$150$.

Example 3 — unscaffolded

A cafe sells a lunch special for $\$15$. The ingredients cost $\$6$ per meal and the cafe's fixed costs are $\$270$ a day. How many specials must it sell (a) to break even, and (b) to make a profit of $\$180$?

The contribution per meal is $15 - 6 = \$9$. (a) Break-even $= \dfrac{270}{9} = 30$ meals. (b) For a $\$180$ profit, $\dfrac{270 + 180}{9} = \dfrac{450}{9} = 50$ meals.

$\therefore$ the cafe breaks even at 30 specials and makes a $\$180$ profit by selling 50.

Example 4 — unscaffolded

A clothing shop buys jackets for $\$40$ each and marks them up by 60%. Find the selling price and the profit on each jacket.

The selling price is $40 \times \left(1 + \dfrac{60}{100}\right) = 40 \times 1.60 = \$64$. The profit is $64 - 40 = \$24$.

$\therefore$ each jacket sells for $\$64$, a profit of $\$24$.

Practice questions

Scaffolded

Q1. A baker sells sourdough loaves for $\$6$ each. (a) Find the revenue from selling 50 loaves. (b) Find the revenue from selling 120 loaves. (c) If the fixed costs are $\$100$ and each loaf costs $\$2$ in ingredients, find the total cost of baking 50 loaves.

Q2. A stall sells printed T-shirts for $\$25$ each. Each shirt costs $\$10$ to make and the stall hire is $\$90$. (a) Find the contribution per shirt. (b) Find the break-even number of shirts. (c) Find the profit if 20 shirts are sold.

Q3. A car-wash charges $\$20$ per car. The soap and water cost $\$5$ per car and the fixed daily cost is $\$180$. (a) Find the break-even number of cars. (b) Find how many cars must be washed for a profit of $\$150$. (c) Find the profit if 30 cars are washed.

Q4. A shop uses mark-up to set prices. (a) A kettle is bought for $\$80$ and marked up by 45%. Find its selling price and the profit. (b) A phone case is bought for $\$25$ and marked up by 120%. Find its selling price.

Q5. A small business expects the monthly income and expenses below.

Item	Amount
Income (sales)	\$5200
Rent	\$1500
Wages	\$1800

Item	Amount
Stock	\$950
Other	\$300

(a) Find the total expenses.

(b) Find the expected profit for the month.

Q6. A community group runs an event. Tickets are $\$30$, the venue costs $\$1200$ (fixed) and catering costs $\$12$ per person. (a) Find the revenue if 100 tickets are sold. (b) Find the total cost for 100 people. (c) Find the profit. (d) Find the break-even number of tickets.

Unscaffolded

Q7. A market gardener sells lettuces for $\$8$ each. Find the revenue from selling 250 lettuces.

Q8. A workshop has fixed costs of $\$500$ and a variable cost of $\$3$ per item. Find the total cost of making 300 items.

Q9. A business sells items for $\$20$ each with a variable cost of $\$8$ and fixed costs of $\$500$. Find the revenue, the total cost and the profit when 300 items are sold.

Q10. A food van sells burgers for $\$20$; each costs $\$8$ to make and the van's fixed cost is $\$240$ a day. Find the break-even number of burgers.

Q11. A business has fixed costs of $\$600$, sells items for $\$25$ with a variable cost of $\$10$. Find how many items give a profit of $\$300$.

Q12. A retailer buys a blender for $\$120$ and marks it up by 35%. Find the selling price and the profit.

Q13. A store wants a profit of 40% of the cost price on an item that cost $\$50$. Find the selling price.

Q14. A stall sells items for $\$15$ each with a variable cost of $\$8$ and fixed costs of $\$900$. Find the profit or loss when only 120 items are sold.

Q15. A printer charges $\$15$ per poster; each costs $\$8$ in materials and the fixed set-up cost is $\$200$. Find the break-even number of posters.

Q16. A cafe's monthly income is $\$8400$. Its expenses are rent $\$2100$, wages $\$1600$, stock $\$2400$ and other $\$850$. Find the profit for the month.

Q17. A shop buys a lamp for $\$45$ and sells it for $\$72$. Find the mark-up as a percentage of the cost price.

Q18. A home baker sells cupcakes for $\$4$ each. Each costs $\$1.50$ to make and the weekly fixed cost (stall and packaging) is $\$175$. (a) Find the break-even number of cupcakes. (b) Find how many cupcakes give a profit of $\$125$. (c) Find the profit if 200 cupcakes are sold.

Answers

Q1. (a) \$300. (b) \$720. (c) \$200. **Q2.** (a) \$15. (b) 6 shirts. (c) \$210. **Q3.** (a) 12 cars. (b) 22 cars. (c) \$270. **Q4.** (a) \$116, profit \$36. (b) \$55. **Q5.** (a) \$4550. (b) \$650. **Q6.** (a) \$3000. (b) \$2400. (c) \$600. (d) 67 tickets. **Q7.** \$2000. **Q8.** \$1400. **Q9.** revenue \$6000, total cost \$2900, profit \$3100. **Q10.** 20 burgers. **Q11.** 60 items. **Q12.** \$162, profit \$42. **Q13.** \$70. **Q14.** a loss of \$60. **Q15.** 29 posters. **Q16.** \$1450. **Q17.** 60%. **Q18.** (a) 70 cupcakes. (b) 120 cupcakes. (c) \$325.

Fully-worked solutions

Q1. (a) Revenue $= 6 \times 50 = \$300$. (b) Revenue $= 6 \times 120 = \$720$. (c) Total cost $= 100 + 2 \times 50 = 100 + 100 = \$200$.

Q2. (a) Contribution $= 25 - 10 = \$15$ per shirt. (b) Break-even $= \dfrac{90}{15} = 6$ shirts. (c) Profit \$= \$ revenue $-$ total cost $= 25 \times 20 - (90 + 10 \times 20) = 500 - 290 = \$210$.

Q3. (a) Contribution $= 20 - 5 = \$15$; break-even $= \dfrac{180}{15} = 12$ cars. (b) Cars for $\$150$ profit $= \dfrac{180 + 150}{15} = \dfrac{330}{15} = 22$ cars. (c) Profit $= 20 \times 30 - (180 + 5 \times 30) = 600 - 330 = \$270$.

Q4. (a) Selling price $= 80 \times 1.45 = \$116$; profit $= 116 - 80 = \$36$. (b) Selling price $= 25 \times \left(1 + \dfrac{120}{100}\right) = 25 \times 2.20 = \$55$.

Q5. (a) Total expenses $= 1500 + 1800 + 950 + 300 = \$4550$. (b) Profit $= 5200 - 4550 = \$650$.

Q6. (a) Revenue $= 30 \times 100 = \$3000$. (b) Total cost $= 1200 + 12 \times 100 = 1200 + 1200 = \$2400$. (c) Profit $= 3000 - 2400 = \$600$. (d) Contribution $= 30 - 12 = \$18$; break-even $= \dfrac{1200}{18} = 66.67$, so round up to 67 tickets.

Q7. Revenue $= 8 \times 250 = \$2000$.

Q8. Total cost $= 500 + 3 \times 300 = 500 + 900 = \$1400$.

Q9. Revenue $= 20 \times 300 = \$6000$. Total cost $= 500 + 8 \times 300 = 500 + 2400 = \$2900$. Profit $= 6000 - 2900 = \$3100$.

Q10. Contribution $= 20 - 8 = \$12$; break-even $= \dfrac{240}{12} = 20$ burgers.

Q11. Contribution $= 25 - 10 = \$15$; items for $\$300$ profit $= \dfrac{600 + 300}{15} = \dfrac{900}{15} = 60$ items.

Q12. Selling price $= 120 \times 1.35 = \$162$; profit $= 162 - 120 = \$42$.

Q13. Selling price $= 50 \times \left(1 + \dfrac{40}{100}\right) = 50 \times 1.40 = \$70$.

Q14. Revenue $= 15 \times 120 = \$1800$. Total cost $= 900 + 8 \times 120 = 900 + 960 = \$1860$. Since $1800 - 1860 = -\$60$, the stall makes a **loss of \$60**.

Q15. Contribution $= 15 - 8 = \$7$; break-even $= \dfrac{200}{7} = 28.57$, so round up to 29 posters.

Q16. Total expenses $= 2100 + 1600 + 2400 + 850 = \$6950$; profit $= 8400 - 6950 = \$1450$.

Q17. Mark-up $= \dfrac{72 - 45}{45} \times 100\% = \dfrac{27}{45} \times 100\% = 60\%$.

Q18. Contribution $= 4 - 1.50 = \$2.50$. (a) Break-even $= \dfrac{175}{2.50} = 70$ cupcakes. (b) Cupcakes for $\$125$ profit $= \dfrac{175+125}{2.50} = \dfrac{300}{2.50} = 120$. (c) Profit $= 4 \times 200 - (175 + 1.50 \times 200) = 800 - 475 = \$325$.

Theory

Every business has **expenses** — the money it spends to operate. It must also deal with the **Goods and Services Tax (GST)**, a $10\,\%$ tax on most sales. This section covers how GST is added, extracted and reported to the Australian Taxation Office (ATO) on a **Business Activity Statement (BAS)**.

Business expenses.

A business records its spending in categories so it can see where the money goes. Typical expense categories include:

- **stock and materials** (goods to sell, ingredients, parts);
- **wages** paid to staff;
- **overheads** — rent, electricity, water, insurance, phone and internet;
- **equipment** and vehicle costs.

Subtracting total expenses from total income gives the business's **profit** (or loss) — covered in 11E.

Adding GST to a price.

Most prices a business quotes are **GST-exclusive** (before tax). Since GST is $10\,\%$:

$$\text{GST} = \text{price} \times 0.10\,,\ \text{GST-inclusive price} = \text{price} \times 1.10\,.$$

For example, a job priced at $\$500$ before GST has $\$50$ of GST added, for a total of $\$550$.

Finding the GST inside a GST-inclusive amount.

A price tag or receipt usually shows the **GST-inclusive** total, with the GST already built in. Because the total is 1.10 times the pre-tax amount, the GST is exactly **one-eleventh** of the total:

$$\text{GST} = \frac{\text{GST-inclusive total}}{11}\,,\ \text{pre-tax amount} = \frac{\text{GST-inclusive total}}{1.10}\,.$$

Dividing by 11 (not 10) is the key idea: a $\$110$ total contains $\$10$ of GST, not $\$11$.

Invoices.

An **invoice** is a request for payment. It lists the goods or services, the **subtotal** (GST-exclusive), the **GST** added, and the **total** owed:

Item	Amount
Subtotal (ex GST)	$\$400.00$
GST (10%)	$\$40.00$
Total	$\$440.00$

The Business Activity Statement (BAS).

Registered businesses report their GST to the ATO on a **BAS**, usually each quarter (every three months). Two figures matter:

- **GST collected** — the GST included in everything the business **sold**;
- **GST paid** — the GST included in everything the business **bought** for the business.

The business only has to hand over the *difference*:

$$\text{net GST} = \text{GST collected} - \text{GST paid}\,.$$

If this is **positive**, the business **pays** that amount to the ATO. If it is **negative**, the business receives a **refund** of that amount (it paid more GST on purchases than it collected on sales).

Leave entitlements.

A full-time employee earns paid **leave** as part of their pay. Under the National Employment Standards, a full-time worker accrues **4 weeks (20 days) of annual leave** and **10 days of personal (sick) leave** each year, building up steadily through the year. Leave accrued after part of a year is worked out **pro-rata**: leave = yearly entitlement $\times \dfrac{\text{months worked}}{12}$.

When annual leave is taken it is paid at the employee's ordinary rate, and many awards add an **annual-leave loading of** 17.5% on top:

$$\text{leave pay} = \text{ordinary pay for the period} \times 1.175.$$

For example, a worker paid $\$1\,000$ per week who takes 1 week of annual leave with 17.5% loading is paid $1\,000 \times 1.175 = \$1\,175$. Leave is a real **expense** to the business, which keeps paying wages while the employee is away.

Worked examples

Example 1 — scaffolded

A landscaping business quotes a job at $\$840$ before GST. Find the GST to be added and the total the customer pays.

Working	Comment
$\text{GST} = 840 \times 0.10 = \$84.$	GST is 10% of the GST-exclusive price.
$\text{Total} = 840 + 84 = \$924.$	Add the GST to the quoted price.
(Check: $840 \times 1.10 = \$924$.)	Multiplying by 1.10 gives the total directly.

Example 2 — scaffolded

A hardware receipt shows a GST-inclusive total of $\$451$. Find the GST included and the pre-tax amount.

Working	Comment
$\text{GST} = \dfrac{451}{11} = \$41.$	The GST inside a total is one-eleventh of it.
$\text{Pre-tax amount} = 451 - 41 = \$410.$	Subtract the GST from the total.
(Check: $410 \times 1.10 = \$451$.)	The pre-tax amount plus its GST gives the total.

Example 3 — unscaffolded

Over one quarter a cafe made GST-inclusive sales of $\$99\,000$ and had GST-inclusive business purchases of $\$52\,800$. Find the net GST it must report on its BAS, and state whether it is payable or a refund.

The GST collected on sales is $\dfrac{99\,000}{11} = \$9\,000$, and the GST paid on purchases is $\dfrac{52\,800}{11} = \$4\,800$. The net GST is

$$\text{net GST} = 9\,000 - 4\,800 = \$4\,200.$$

Since this is positive, the cafe collected more GST than it paid.

$\therefore$ the cafe must **pay** $\$4\,200$ to the ATO.

Example 4 — unscaffolded

In its first quarter a new online business had GST-inclusive sales of $\$22\,000$ but spent $\$46\,200$ (GST-inclusive) setting up. Find the net GST on its BAS.

The GST collected on sales is $\frac{22\,000}{11} = \$2\,000$, and the GST paid on purchases is $\frac{46\,200}{11} = \$4\,200$. The net GST is

$$\text{net GST} = 2\,000 - 4\,200 = -\$2\,200.$$

The result is negative, so the business paid more GST than it collected.

$\therefore$ the business receives a **refund** of $\$2\,200$ from the ATO.

Practice questions

Scaffolded

Q1. An electrician quotes a job at $\$1\,250$ before GST. (a) Find the GST to be added. (b) Find the total the customer pays.

Q2. A tool kit costs $\$968$ including GST. (a) Find the GST included in the price. (b) Find the pre-tax (GST-exclusive) amount.

Q3. A signwriter prepares an invoice with a subtotal of $\$3\,400$ (ex GST). (a) Find the GST to add. (b) Find the invoice total. (c) A second item worth $\$600$ (ex GST) is added, making the subtotal $\$4\,000$. Find the new GST and new total.

Q4. In a month a market stall makes GST-exclusive sales of $\$6\,500$. Find the GST it collects.

Q5. A business buys stock for $\$4\,730$ including GST. Find the GST it paid.

Q6. On its BAS a business reports GST collected of $\$2\,400$ and GST paid of $\$1\,650$. Find the net GST, and state whether it is payable or a refund.

Unscaffolded

Q7. Add GST to a service priced at $\$560$ before GST, and state the total.

Q8. A receipt total is $\$341$ including GST. Find the GST included and the pre-tax amount.

Q9. A plumber's invoice has a subtotal of $\$2\,150$ before GST. Find the GST and the invoice total.

Q10. A shop's GST-inclusive sales for a quarter are $\$46\,200$. Find the GST collected.

Q11. A business's GST-inclusive purchases for a quarter are $\$23\,100$. Find the GST paid.

Q12. A business reports GST collected of $\$5\,600$ and GST paid of $\$3\,900$ on its BAS. Find the net GST and state whether it is payable or a refund.

Q13. A business reports GST collected of $\$1\,800$ and GST paid of $\$3\,500$. Find the net GST and state whether it is payable or a refund.

Q14. In a quarter a bakery has GST-inclusive sales of $\$110\,000$ and GST-inclusive purchases of $\$66\,000$. Find the GST collected, the GST paid, and the net GST on the BAS.

Q15. A machine costs $\$1\,507$ including GST. Find the GST included and the pre-tax amount.

Q16. A builder invoices $\$4\,800$ (ex GST) for labour and $\$1\,200$ (ex GST) for materials. (a) Find the subtotal. (b) Find the GST. (c) Find the invoice total.

Q17. A café has GST-inclusive sales of $\$88\,000$ and GST-inclusive purchases of $\$35\,200$ in a quarter. Find the GST collected, the GST paid, and the net GST.

Q18. A start-up has GST-inclusive sales of $\$33\,000$ and GST-inclusive purchases of $\$52\,800$ in its first quarter. Find the net GST, and state whether it is payable or a refund.

Q19. A full-time employee earns $\$1\,200$ per week and is entitled to 4 weeks of annual leave per year, accruing evenly. (a) Find how many weeks of annual leave she has accrued after 9 months. (b) She takes 2 weeks of annual leave, paid with 17.5% leave loading. Find her total leave pay for the 2 weeks.

Q20. A café worker is paid $\$24$ per hour and works a 38-hour week. Full-time annual leave is 4 weeks per year. (a) Find her weekly ordinary pay. (b) Find the value of her full 4-week annual-leave entitlement, including 17.5% leave loading.

Answers

Q1. (a) $\$125$. (b) $\$1375$. **Q2.** (a) $\$88$. (b) $\$880$. **Q3.** (a) $\$340$. (b) $\$3740$. (c) GST $\$400$, total $\$4400$. **Q4.** $\$650$. **Q5.** $\$430$. **Q6.** net GST $\$750$, payable. **Q7.** GST $\$56$, total $\$616$. **Q8.** GST $\$31$, pre-tax $\$310$. **Q9.** GST $\$215$, total $\$2365$. **Q10.** $\$4200$. **Q11.** $\$2100$. **Q12.** net GST $\$1700$, payable. **Q13.** net GST $\$1700$, refund. **Q14.** collected $\$10000$, paid $\$6000$, net $\$4000$ (payable). **Q15.** GST $\$137$, pre-tax $\$1370$. **Q16.** (a) $\$6000$. (b) $\$600$. (c) $\$6600$. **Q17.** collected $\$8000$, paid $\$3200$, net $\$4800$ (payable). **Q18.** net GST $\$1800$, refund. **Q19.** (a) 3 weeks. (b) $\$2820$. **Q20.** (a) $\$912$. (b) $\$4286.40$.

Fully-worked solutions

Q1. (a) GST $= 1250 \times 0.10 = \$125$. (b) Total $= 1250 + 125 = \$1375$ (or 1250×1.10).

Q2. (a) GST $= \dfrac{968}{11} = \$88$. (b) Pre-tax $= 968 - 88 = \$880$ (check $880 \times 1.10 = 968$).

Q3. (a) GST $= 3400 \times 0.10 = \$340$. (b) Total $= 3400 + 340 = \$3740$. (c) New subtotal $\$4000$: GST $= 4000 \times 0.10 = \$400$, total $= 4000 + 400 = \$4400$.

Q4. GST collected $= 6500 \times 0.10 = \$650$ (the sales are GST-exclusive, so add 10%).

Q5. The purchase is GST-inclusive, so GST paid $= \dfrac{4730}{11} = \$430$.

Q6. net GST $= 2400 - 1650 = \$750$. It is positive, so $\$750$ is **payable** to the ATO.

Q7. GST $= 560 \times 0.10 = \$56$; total $= 560 + 56 = \$616$.

Q8. GST $= \dfrac{341}{11} = \$31$; pre-tax $= 341 - 31 = \$310$.

Q9. GST $= 2150 \times 0.10 = \$215$; total $= 2150 + 215 = \$2365$.

Q10. The sales are GST-inclusive, so GST collected $= \dfrac{46200}{11} = \$4200$.

Q11. GST paid $= \dfrac{23100}{11} = \$2100$.

Q12. net GST $= 5600 - 3900 = \$1700$; positive, so **payable**.

Q13. net GST $= 1800 - 3500 = -\$1700$; negative, so a **refund** of $\$1700$.

Q14. GST collected $= \dfrac{110000}{11} = \$10000$; GST paid $= \dfrac{66000}{11} = \$6000$; net GST $= 10000 - 6000 = \$4000$, payable.

Q15. GST $= \dfrac{1507}{11} = \$137$; pre-tax $= 1507 - 137 = \$1370$.

Q16. (a) Subtotal $= 4800 + 1200 = \$6000$. (b) GST $= 6000 \times 0.10 = \$600$. (c) Total $= 6000 + 600 = \$6600$.

Q17. GST collected $= \dfrac{88000}{11} = \$8000$; GST paid $= \dfrac{35200}{11} = \$3200$; net GST $= 8000 - 3200 = \$4800$, payable.

Q18. GST collected $= \dfrac{33000}{11} = \$3000$; GST paid $= \dfrac{52800}{11} = \$4800$; net GST $= 3000 - 4800 = -\$1800$, a **refund** of $\$1800$.

Q19. (a) Annual leave accrued $= 4 \times \frac{9}{12} = 3$ weeks. (b) Two weeks' ordinary pay $= 2 \times 1\,200 = \$2\,400$; with $17.5\,\%$ loading, $2\,400 \times 1.175 = \$2\,820$.

Q20. (a) Weekly ordinary pay $= 24 \times 38 = \$912$. (b) Four weeks' ordinary pay $= 4 \times 912 = \$3\,648$; with $17.5\,\%$ loading, $3\,648 \times 1.175 = \$4\,286.40$.

Theory

A **financial statement** is a summary of the money flowing through a business over a set period of time. It lets an owner, a lender or an investor see at a glance whether the business is making money. The one you need here is the **income statement**, also called a profit-and-loss statement.

The income statement.

An income statement shows, over a period (a month, a quarter or a year), how the business's **revenue** turned into **profit**. It is built in two steps. First, subtract the **cost of goods sold** (COGS — what the stock actually cost the business) from the revenue to get the **gross profit**:

$$\text{gross profit} = \text{revenue} - \text{cost of goods sold}.$$

Then subtract the **operating expenses** (rent, wages, utilities, insurance and so on) to get the **net profit**:

$$\text{net profit} = \text{gross profit} - \text{operating expenses}.$$

A worked layout for a cafe over one year:

Item	Amount
Revenue (sales)	\$180 000
less Cost of goods sold	\$72 000
Gross profit	**\$108 000**
less Operating expenses	\$87 000
Net profit	**\$21 000**

Profit and loss.

If total expenses come to **more** than the revenue, the "net profit" is **negative** — the business has made a **net loss**. A net profit of $-\$8\,000$ means a loss of \$8 000. Reading the sign of the bottom line is the first thing to check.

Profit margin.

The **net profit margin** expresses the net profit as a percentage of the revenue, so businesses of different sizes can be compared:

$$\text{net profit margin} = \frac{\text{net profit}}{\text{revenue}} \times 100\,\%.$$

The cafe above has a margin of $\frac{21\,000}{180\,000} \times 100\,\% \approx 11.7\,\%$: for every \$100 of sales it keeps about \$11.70 as profit. A higher margin means the business keeps more of each sales dollar, so it is turning its sales into profit more **efficiently**.

The period a statement covers.

Every income statement states the period it covers, because a profit figure means nothing without one. Many businesses draw one up each **quarter** (three months) so that it lines up with the **Business Activity Statement (BAS)** they already lodge with the ATO, and then add the four quarters to get the year. Comparing two statements is only fair when their periods are the same length: a quarter's profit set beside a year's profit tells you nothing.

Where only one quarter is known and it is typical of the rest, multiplying by 4 gives a rough estimate of the year — rough, because trade in many businesses is seasonal.

Comparing statements.

Comparing two periods (this year vs last) or two businesses shows how things are changing. Look at more than one figure: revenue can **rise** while the margin **falls** (costs grew faster than sales), so a bigger business is not automatically a healthier one. Always state which measure — net profit or margin — supports your conclusion.

Worked examples

Example 1 — scaffolded

A cafe's yearly figures are: revenue \$180 000, cost of goods sold \$72 000, and operating expenses of rent \$24 000, wages \$48 000, utilities \$6 000 and other \$9 000. Prepare the income statement and find the net profit.

Working	Comment
Operating expenses $= 24\,000 + 48\,000 + 6\,000 + 9\,000 = \$87\,000.$	Add all the running costs.
Gross profit $= 180\,000 - 72\,000 = \$108\,000.$	Revenue − cost of goods sold.
Net profit $= 108\,000 - 87\,000 = \$21\,000.$	Gross profit − operating expenses.
The bottom line is positive, so the cafe made a **profit** of \$21 000.	A positive net profit means the business is in profit.

Example 2 — scaffolded

A shop has revenue \$250 000, cost of goods sold \$100 000 and operating expenses \$120 000. Find its net profit and its net profit margin.

Working	Comment
Gross profit $= 250\,000 - 100\,000 = \$150\,000.$	Revenue − COGS.
Net profit $= 150\,000 - 120\,000 = \$30\,000.$	Gross profit − operating expenses.
Margin $= \dfrac{30\,000}{250\,000} \times 100\,\% = 12\,\%.$	Net profit as a percentage of revenue.
The shop keeps \$12 of every \$100 of sales as profit.	Interpret the margin in context.

Example 3 — unscaffolded

A hair salon draws up an income statement each quarter so that it lines up with its BAS. For the March quarter its revenue was \$78 000, its cost of goods sold was \$18 000 and its operating expenses were \$52 200. Find the salon's net profit and net profit margin for the quarter, and estimate its net profit for the year if the other three quarters are similar.

The gross profit for the quarter is $78\,000 - 18\,000 = \$60\,000$, so the net profit is

$$\text{net profit} = 60\,000 - 52\,200 = \$7\,800.$$

The margin is $\dfrac{7\,800}{78\,000} \times 100\,\% = 10\,\%$, and four similar quarters would give $4 \times 7\,800 = \$31\,200$.

$\therefore$ the salon made \$7 800 for the quarter at a margin of $10\,\%$, and would make about \$31 200 over the year — an estimate only, since trade may be seasonal.

Example 4 — unscaffolded

A bakery reports: Year 1 — revenue \$200 000, COGS \$80 000, operating expenses \$96 000; Year 2 — revenue \$240 000, COGS \$100 000, operating expenses \$113 600. Compare the two years using net profit and net profit margin.

In Year 1 the gross profit is $200\,000 - 80\,000 = \$120\,000$ and the net profit is $120\,000 - 96\,000 = \$24\,000$, a margin of $\dfrac{24\,000}{200\,000} \times 100\,\% = 12\,\%$. In Year 2 the gross profit is $240\,000 - 100\,000 = \$140\,000$ and the net profit is $140\,000 - 113\,600 = \$26\,400$, a margin of $\dfrac{26\,400}{240\,000} \times 100\,\% = 11\,\%$.

∴ Year 2's revenue and net profit are both **higher** (net profit up \$2 400), but its **margin fell** from 12% to 11% — costs grew faster than sales, so the business is larger but slightly less efficient per sales dollar.

Practice questions

Scaffolded

Q1. A business has revenue \$120 000, cost of goods sold \$45 000 and operating expenses \$55 000. (a) Find the gross profit. (b) Find the net profit. (c) State whether the business made a profit or a loss.

Q2. A retailer has revenue \$150 000, cost of goods sold \$60 000 and operating expenses \$72 000. (a) Find the net profit. (b) Find the net profit margin. (c) Explain what the margin means for every \$100 of sales.

Q3. An income statement shows a gross profit of \$90 000 and a net profit of \$32 000. (a) Which line of the statement is missing? (b) Find its value. (c) State the calculation you used.

Q4. A bookshop draws up an income statement for each BAS quarter. For the March quarter it had revenue \$90 000, cost of goods sold \$36 000 and operating expenses \$45 000. (a) Find the net profit for the quarter. (b) Find the net profit margin for the quarter. (c) State why an income statement must say which period it covers.

Q5. A market stall has revenue \$80 000, cost of goods sold \$40 000 and operating expenses \$50 000. (a) Find the gross profit. (b) Find the net profit. (c) Explain what the sign of your answer to (b) tells you.

Q6. Two cafes report: Cafe A — revenue \$160 000, COGS \$64 000, expenses \$76 000; Cafe B — revenue \$200 000, COGS \$90 000, expenses \$88 000. (a) Find each cafe's net profit. (b) Find each cafe's net profit margin. (c) Using the margins, state which cafe is more efficient.

Unscaffolded

Q7. A business has revenue \$96 000, cost of goods sold \$36 000 and operating expenses \$44 000. Find the gross profit and the net profit.

Q8. A company has revenue \$320 000, cost of goods sold \$128 000 and operating expenses \$160 000. Find the net profit and the net profit margin.

Q9. A shop's income statement shows revenue \$140 000 and a gross profit of \$95 000. Find the cost of goods sold.

Q10. A florist's net profits for the four quarters of one year were \$14 500, \$9 200, \$11 800 and \$21 500. Find the net profit for the year, the average net profit per quarter, and state which quarter was the strongest.

Q11. A business has revenue \$110 000, cost of goods sold \$60 000 and operating expenses \$58 000. Find the net profit and state whether the business made a profit or a loss.

Q12. A firm reports: Year 1 — revenue \$300 000, COGS \$120 000, expenses \$144 000; Year 2 — revenue \$360 000, COGS \$150 000, expenses \$174 000. Compare the two years using net profit and net profit margin, and comment.

Q13. A business's yearly income statement shows revenue \$260 000 and a net profit margin of 15%. Find its net profit.

Q14. A small business has revenue \$75 000, cost of goods sold \$30 000 and operating expenses \$33 000. Find the net profit and the net profit margin.

Q15. An income statement shows a gross profit of \$140 000 and operating expenses of \$95 000. Find the net profit.

Q16. A landscaping business reports, for the year: revenue \$220 000, cost of materials \$77 000, and operating expenses of wages \$60 000, vehicle costs \$18 000, insurance \$10 000 and other \$11 000. Find the net profit and the net profit margin.

Q17. Business A has revenue \$250 000 and a net profit of \$30 000. Business B has revenue \$180 000 and a net profit of \$21 600. Find each business's net profit margin and state what your answer shows about comparing businesses of different sizes.

Q18. A cafe reports revenue \$420 000, cost of goods sold \$168 000, and operating expenses of rent \$60 000, wages \$132 000 and other \$24 000. Its owner set a target net profit margin of 10 % for the year. Find the gross profit, the net profit and the net profit margin, and state whether the cafe met the owner's target.

Answers

Q1. (a) \$75 000. (b) \$20 000. (c) profit. **Q2.** (a) \$18 000. (b) 12%. (c) the business keeps \$12 of every \$100 of sales as profit. **Q3.** (a) operating expenses. (b) \$58 000. (c) $90\,000 - 32\,000$. **Q4.** (a) \$9 000. (b) 10%. (c) a profit figure means nothing without a period — a quarter's profit cannot be compared with a year's. **Q5.** (a) \$40 000. (b) $-\$10\,000$. (c) it is negative, so the stall made a net **loss** of \$10 000. **Q6.** (a) A \$20 000, B \$22 000. (b) A 12.5%, B 11%. (c) Cafe A (higher margin). **Q7.** gross profit \$60 000, net profit \$16 000. **Q8.** net profit \$32 000, margin 10%. **Q9.** \$45 000. **Q10.** year \$57 000, average \$14 250 per quarter; the fourth quarter was the strongest. **Q11.** $-\$8\,000$; a net **loss** of \$8 000. **Q12.** Y1 net \$36 000 (12%); Y2 net \$36 000 (10%). Same net profit, but the margin fell from 12% to 10% — sales rose but so did costs, so the firm is no more profitable and is less efficient per dollar. **Q13.** \$39 000. **Q14.** net profit \$12 000, margin 16%. **Q15.** \$45 000. **Q16.** net profit \$44 000, margin 20%. **Q17.** A 12%, B 12%; the two businesses have the same margin even though A is larger — margin lets you compare efficiency regardless of size. **Q18.** gross profit \$252 000, net profit \$36 000, margin $\approx 8.57\%$; the cafe is profitable, but its margin is below the 10% target, so the target was **not** met.

Fully-worked solutions

Q1. (a) Gross profit $= 120\,000 - 45\,000 = \$75\,000$. (b) Net profit $= 75\,000 - 55\,000 = \$20\,000$. (c) The net profit is positive, so the business made a **profit**.

Q2. (a) Gross profit $= 150\,000 - 60\,000 = \$90\,000$, so net profit $= 90\,000 - 72\,000 = \$18\,000$. (b) Margin $= \dfrac{18\,000}{150\,000} \times 100\% = 12\%$. (c) A 12% margin means the business keeps \$12 of every \$100 of sales as profit.

Q3. (a) The statement gives gross profit and net profit, so the missing line is the **operating expenses**. (b) Since net profit = gross profit − operating expenses, the operating expenses $= 90\,000 - 32\,000 = \$58\,000$. (c) The calculation is gross profit − net profit $= 90\,000 - 32\,000$.

Q4. (a) Gross profit $= 90\,000 - 36\,000 = \$54\,000$, so the net profit for the quarter is $54\,000 - 45\,000 = \$9\,000$. (b) Margin $= \dfrac{9\,000}{90\,000} \times 100\% = 10\%$. (c) A profit figure only means something for a stated period, so the statement must name it — a quarter's \$9 000 cannot be set beside a whole year's profit.

Q5. (a) Gross profit $= 80\,000 - 40\,000 = \$40\,000$. (b) Net profit $= 40\,000 - 50\,000 = -\$10\,000$. (c) The answer is negative, so the expenses exceeded the gross profit and the stall made a net **loss** of \$10 000.

Q6. (a) Cafe A: gross $= 160\,000 - 64\,000 = 96\,000$, net $= 96\,000 - 76\,000 = \$20\,000$. Cafe B: gross $= 200\,000 - 90\,000 = 110\,000$, net $= 110\,000 - 88\,000 = \$22\,000$. (b) A: $\dfrac{20\,000}{160\,000} \times 100\% = 12.5\%$. B: $\dfrac{22\,000}{200\,000} \times 100\% = 11\%$. (c) Cafe A has the higher margin (12.5% vs 11%), so it is **more efficient** — it keeps more of each sales dollar, even though Cafe B makes more total profit.

Q7. Gross profit $= 96\,000 - 36\,000 = \$60\,000$; net profit $= 60\,000 - 44\,000 = \$16\,000$.

Q8. Gross profit $= 320\,000 - 128\,000 = 192\,000$; net profit $= 192\,000 - 160\,000 = \$32\,000$; margin $= \dfrac{32\,000}{320\,000} \times 100\% = 10\%$.

Q9. Cost of goods sold = revenue − gross profit $= 140\,000 - 95\,000 = \$45\,000$.

Q10. Net profit for the year $= 14\,500 + 9\,200 + 11\,800 + 21\,500 = \$57\,000$; the average per quarter $= \dfrac{57\,000}{4} = \$14\,250$. The largest of the four figures is \$21 500, so the **fourth quarter** was the strongest.

Q11. Gross profit $= 110\,000 - 60\,000 = 50\,000$; net profit $= 50\,000 - 58\,000 = -\$8\,000$. The result is negative, so the business made a net **loss** of \$8 000.

Q12. Year 1: gross $= 300\,000 - 120\,000 = 180\,000$, net $= 180\,000 - 144\,000 = \$36\,000$, margin $= \dfrac{36\,000}{300\,000} \times 100\,\% = 12\,\%$. Year 2: gross $= 360\,000 - 150\,000 = 210\,000$, net $= 210\,000 - 174\,000 = \$36\,000$, margin $= \dfrac{36\,000}{360\,000} \times 100\,\% = 10\,\%$. The net profit is the **same** (\$36 000) despite \$60 000 more revenue, and the margin **fell** from $12\,\%$ to $10\,\%$ — the extra sales were entirely eaten by extra costs, so the firm became larger but less efficient.

Q13. The margin is the net profit as a percentage of the revenue, so the net profit is $15\,\%$ of the revenue: net profit $= 0.15 \times 260\,000 = \$39\,000$.

Q14. Gross profit $= 75\,000 - 30\,000 = 45\,000$; net profit $= 45\,000 - 33\,000 = \$12\,000$; margin $= \dfrac{12\,000}{75\,000} \times 100\,\% = 16\,\%$.

Q15. Net profit = gross profit − operating expenses $= 140\,000 - 95\,000 = \$45\,000$.

Q16. Operating expenses $= 60\,000 + 18\,000 + 10\,000 + 11\,000 = \$99\,000$. Gross profit $= 220\,000 - 77\,000 = \$143\,000$; net profit $= 143\,000 - 99\,000 = \$44\,000$; margin $= \dfrac{44\,000}{220\,000} \times 100\,\% = 20\,\%$.

Q17. Business A: $\dfrac{30\,000}{250\,000} \times 100\,\% = 12\,\%$. Business B: $\dfrac{21\,600}{180\,000} \times 100\,\% = 12\,\%$. Both have a $12\,\%$ margin, so although A earns more total profit and is larger, the two are **equally efficient** per sales dollar — the margin lets you compare businesses of different sizes fairly.

Q18. Operating expenses $= 60\,000 + 132\,000 + 24\,000 = \$216\,000$. Gross profit $= 420\,000 - 168\,000 = \$252\,000$; net profit $= 252\,000 - 216\,000 = \$36\,000$; margin $= \dfrac{36\,000}{420\,000} \times 100\,\% \approx 8.57\,\%$. The cafe is profitable, but $8.57\,\%$ is below the owner's target of $10\,\%$, so the target was **not** met: to reach it on this revenue the cafe would need a net profit of $0.10 \times 420\,000 = \$42\,000$.

Topic 3 Test A — Multiple-choice

Topic 3 (Financial and consumer mathematics), cumulative over Chapters 9–11. Approved materials: one bound reference that may be annotated; one scientific calculator. Section A: 15 multiple-choice questions (15 marks). Approximate time: 25 minutes. Unless otherwise indicated, values are in Australian dollars.

Section A — Multiple-choice questions

Choose the response that is correct for the question.

Question 1

The simple interest earned on $\$2000$ invested at 5% per annum for 3 years is

A. $\$600$

B. $\$2100$

C. $\$2300$

D. $\$300$

Question 2

The value of $\$4000$ invested at 6% per annum compound interest after 2 years is

A. $\$4240.00$

B. $\$4720.00$

C. $\$4494.40$

D. $\$4480.00$

Question 3

An item is priced at $\$120$ before GST. After 10% GST is added, the price is

A. $\$121.20$

B. $\$132$

C. $\$130$

D. $\$108$

Question 4

A 500 g pack of rice costs $\$4.00$ and a 750 g pack costs $\$5.40$. Which is the better value for money?

A. it cannot be determined

B. the 500 g pack

C. the 750 g pack

D. they are equal value

Question 5

A traveller converts $\$600$ Australian to US dollars when $\$1$ AUD = US$\$0.66$. The amount received is

A. US$\$396$

B. US$\$909$

C. US$\$66$

D. US$\$660$

Question 6

Income tax is nil on the first $\$18\,200$ of taxable income and 16 cents per dollar on income above $\$18\,200$. The tax on a taxable income of $\$30\,000$ is

A. $\$4800$

B. $\$1920$

C. $\$1180$

D. $\$1888$

Question 7

The Medicare levy is 2% of taxable income. On a taxable income of $\$55\,000$ the levy is

A. $\$1000$

B. $\$2750$

C. $\$1100$

D. $\$110$

Question 8

An employer pays superannuation at 12% of ordinary earnings. On earnings of $\$64\,000$ the super contribution is

A. $\$6400$

B. $\$5760$

C. $\$7680$

D. $\$768$

Question 9

A jacket priced at $\$80$ is discounted by 25%. The sale price is

A. $\$100$

B. $\$60$

C. $\$55$

D. $\$20$

Question 10

A market stall's weekly revenue is $R = 8n$ dollars and its total cost is $C = 200 + 3n$ dollars for n items. The stall breaks even when n equals

A. 40

B. 25

C. 20

D. 200

Question 11

A business has income of $\$12\,500$ and expenditure of $\$9800$. Its profit is

A. $\$2300$

B. $\$22\,300$

C. $\$3700$

D. $\$2700$

Question 12

In a quarter a business collected $\$3400$ in GST on sales and paid $\$1250$ in GST on purchases. The net GST payable to the ATO is

A. $\$4650$

B. $\$1250$

C. $\$3400$

D. $\$2150$

Question 13

A personal loan is repaid at $\$250$ per month for 24 months. The total amount repaid is

A. $\$274$

B. $\$6250$

C. $\$6000$

D. $\$3000$

Question 14

A business reports revenue of $\$85\,000$, cost of goods sold of $\$40\,000$ and other expenses of $\$24\,000$. Its net profit is

A. $\$24\,000$

B. $\$21\,000$

C. $\$45\,000$

D. $\$61\,000$

Question 15

A worker receives a pay rise of 3 % in a year in which inflation is 4 %. The worker's buying power has

A. fallen

B. risen

C. stayed the same

D. risen by 7 %

End of Section A

Topic 3 Test A — Solutions

Question	Answer	Working
1	**D**	$I = \frac{Prt}{100} = \frac{2000 \times 5 \times 3}{100} = \$300.$
2	**C**	$A = 4000 \times 1.06^2 = \$4494.40.$
3	**B**	$120 \times 1.10 = \$132.$
4	**C**	$\$4.00 / 500\,\text{g} = 0.80$ c/g; $\$5.40 / 750\,\text{g} = 0.72$ c/g — the 750 g pack is cheaper per gram.
5	**A**	\$600 = \$ US$\$396.$
6	**D**	$0.16 \times (30\,000 - 18\,200) = 0.16 \times 11$.
7	**C**	$0.02 \times 55\,000 = \$1100.$
8	**C**	$0.12 \times 64\,000 = \$7680.$
9	**B**	$80 \times (1 - 0.25) = 80 \times 0.75 = \$60.$
10	**A**	$8n = 200 + 3n \Rightarrow 5n = 200 \Rightarrow n = 40$.
11	**D**	profit = income − expenditure $= 12\,500 - 9800 = \$2700.$
12	**D**	net GST $= 3400 - 1250 = \$2150.$
13	**C**	$250 \times 24 = \$6000.$
14	**B**	$85\,000 - 40\,000 - 24\,000 = \$21\,000$.
15	**A**	the 3% rise is below 4% inflation, so real buying power has fallen.

Topic 3 Test B — Short answer

Section B: 6 questions (30 marks). Approximate time: 40 minutes. Approved materials: one bound reference; one scientific calculator. Answer all questions in the spaces provided. In questions where more than one mark is available, appropriate working must be shown. Only round when instructed.

Section B

Question 1 (5 marks)

Priya invests $\$2500$.

a. Find the simple interest earned at 4% per annum for 3 years. 1 mark

b. Show that, at 4% per annum compound interest, the investment is worth $\$2812.16$ after 3 years. 2 marks

c. Find how much more interest the compound investment earns than the simple interest over the 3 years. 2 marks

Question 2 (5 marks)

Sam's taxable income for the year is $\$52\,000$. Income tax is calculated using the table below.

Taxable income	Tax on this income
$0 - \$18\,200$	Nil
$\$18\,201 - \$45\,000$	16c for each $\$1$ over $\$18\,200$
$\$45\,001 - \$135\,000$	$\$4288$ plus 30c for each $\$1$ over $\$45\,000$

a. Show that Sam's income tax is $\$6388$. 2 marks

b. The Medicare levy is 2% of taxable income. Find the levy Sam must pay. 1 mark

c. Find Sam's net income for the year after income tax and the Medicare levy. 2 marks

Question 3 (5 marks)

A candle maker sells candles for $\$12$ each. The weekly fixed costs are $\$480$ and each candle costs $\$4$ to make.

a. Write an expression for the weekly revenue R and one for the total weekly cost C when n candles are made and sold. 1 mark

b. Show that the business breaks even when 60 candles are sold. 2 marks

c. Find the weekly profit when 100 candles are sold. 2 marks

Question 4 (5 marks)

In one quarter a small business had sales of $\$27\,500$ (including GST) and purchases of $\$9900$ (including GST). GST is 10%.

a. Find the GST included in the sales. 2 marks

b. Find the GST included in the purchases. 1 mark

c. Find the net GST the business must pay on its Business Activity Statement (BAS). 2 marks

Question 5 (5 marks)

Two mobile phone plans each run for 24 months. Plan A costs $\$45$ per month. Plan B costs $\$39$ per month plus a one-off $\$120$ handset fee.

a. Find the total cost of Plan A over 24 months. 1 mark

b. Find the total cost of Plan B over 24 months. 2 marks

c. State which plan is cheaper over the 24 months, and by how much. 2 marks

Question 6 (5 marks)

a. A traveller converts $\$800$ Australian to euros when $\$1$ AUD = €0.60. Find the number of euros she receives. 1 mark

b. She returns with €120 and converts it back to Australian dollars at the same rate. Find the amount she receives, in Australian dollars. 2 marks

c. A basket of groceries that cost $\$80$ last year now costs $\$86$. Find the percentage increase in its cost. 2 marks

End of Section B

Topic 3 Test B — Solutions

Question 1.

a. $I = \dfrac{P\,r\,t}{100} = \dfrac{2500 \times 4 \times 3}{100} = \$300.$

b. Using $A = P\,R^n$ with $R = 1 + \dfrac{4}{100} = 1.04$ and $n = 3$,

$$A = 2500 \times 1.04^3 = 2500 \times 1.124864 = \$2812.16.$$

So the investment is worth $\$2812.16$ after 3 years.

c. The compound interest earned is $2812.16 - 2500 = \$312.16$. The simple interest (from part **a**) is $\$300$. The compound investment earns $312.16 - 300 = \$12.16$ more.

Question 2.

a. Sam's income of $\$52\,000$ falls in the third bracket. The tax is

$$\$4288 + 0.30 \times (52\,000 - 45\,000) = 4288 + 0.30 \times 7000 = 4288 + 2100 = \$6388.$$

(The $\$4288$ is the tax on the first $\$45\,000$: $0.16 \times (45\,000 - 18\,200) = 0.16 \times 26\,800 = \$4288$.)

b. Medicare levy $= 0.02 \times 52\,000 = \$1040.$

c. Net income $= 52\,000 - 6388 - 1040 = \$44\,572.$

Question 3.

a. $R = 12\,n$ dollars and $C = 480 + 4\,n$ dollars.

b. The business breaks even when $R = C$:

$$12\,n = 480 + 4\,n.$$

Subtracting $4\,n$ from both sides gives $8\,n = 480$, so $n = \dfrac{480}{8} = 60$. The business breaks even at 60 candles.

c. At $n = 100$: revenue $= 12 \times 100 = \$1200$, cost $= 480 + 4 \times 100 = \$880$. Profit $= 1200 - 880 = \$320$.

Question 4.

a. The sales price includes GST, so the GST is one-eleventh of the total: $\dfrac{27\,500}{11} = \$2500.$

b. GST in the purchases $= \dfrac{9900}{11} = \$900.$

c. Net GST payable = GST collected − GST paid $= 2500 - 900 = \$1600.$

Question 5.

a. Plan A: $45 \times 24 = \$1080.$

b. Plan B: $39 \times 24 + 120 = 936 + 120 = \$1056.$

c. Plan B is cheaper, by $1080 - 1056 = \$24$ over the 24 months.

Question 6.

a. $800 \times 0.60 = €480.$

b. Converting back at $\$1 = €0.60$: $\dfrac{120}{0.60} = \$200$.

c. Percentage increase $= \dfrac{86-80}{80} \times 100\,\% = \dfrac{6}{80} \times 100\,\% = 7.5\,\%$.