IB Business Management - HL

Circular Manufacturing and Strategic Trade-offs

Circular economy, automation, regulation and long-term growth choices

HL2

Worksheet

Suggested time	70 minutes	**Total marks**	60
Assessment use	Trimester school assessment / teacher-created practice	**Focus**	circular economy, automation, sustainability, strategic evaluation
Student	Name: _____ Class: _____ Date: _____	**Calculator**	Allowed for calculations where needed

- Original teacher-created IB-style practice worksheet. Not an official IB assessment document.
- Answer in context where possible. Show working for calculations and support evaluations with clear judgment.
- This PDF includes the full answer key and marking guidance at the end for teacher use.

Section A - Multiple choice (8 marks)

Choose one answer for each question.

1. A circular economy model aims to: **[1]**

A. keep materials in use for longer and reduce waste

B. maximize landfill at all costs

C. remove all labour from production

D. focus only on short-term sales volume

2. An automated sorting system is an example of: **[1]**

A. land

B. capital

C. enterprise

D. profit

3. Two specialist data technicians are best classified as: **[1]**

A. land

B. highly skilled labour

C. fixed costs only

D. natural resources

4. A stricter waste-disposal rule imposed by government is an example of: **[1]**

A. an internal objective

B. a market segment

C. a factor of production

D. an external legal influence

5. If variable cost falls while selling price stays the same, contribution per unit will: **[1]**

A. increase

B. fall to zero

C. become a fixed cost

D. move to the primary sector

6. Turning production waste into a reusable input is best described as: **[1]**

A. ignoring a by-product

B. creating value from what would otherwise be waste

C. eliminating all stakeholders

D. a tertiary-sector activity only

7. A national marketing campaign may create operational risk if: **[1]**

A. demand rises faster than the factory can maintain quality

B. fixed costs are already known

C. the business uses any machines

D. customers receive information

8. Sustainable growth differs from simple growth because it also considers: **[1]**

A. only short-term revenue

B. whether managers like the product

C. nothing beyond output volume

D. environmental and social impact as well as financial performance

Section B - Short answer (16 marks)

Answer in full sentences and apply the case or examples where appropriate.

9. Explain how by-products can be turned into a source of value in manufacturing. **[4]**

10. Distinguish between economic growth and sustainable growth in a manufacturing context. **[4]**

11. Explain one possible impact of stricter environmental laws on production decisions. **[4]**

12. Explain why highly skilled labour may be a source of competitive advantage in a circular manufacturing firm. **[4]**

Section C - Data response / case study (24 marks)

Read the stimulus below and answer all parts of Question 13.

ReLoop Materials

ReLoop Materials makes food-grade plastic containers from a mixture of recycled and virgin plastic. It sells to restaurant chains and supermarkets that want lower-emission packaging. ReLoop's managers know that customers value reliability as well as sustainability, so they are deciding whether to invest in automated sorting technology or expand marketing to win new clients.

Current monthly data are: output sold 420,000 containers; average selling price $0.44 each; variable material and direct labour cost $0.27 each; monthly fixed costs $52,000; waste sent to landfill 18 tonnes per month. Option A is an automated sorting system with a one-time cost of $210,000, an expected fall in variable cost of $0.03 per container, and a reduction in landfill waste of 10 tonnes per month. Option B is a national marketing campaign costing $48,000 for the first three months and expected to raise sales by 16%, but it may create capacity pressure and more defects.

Current monthly data and strategic options

Item	Value
Containers sold per month	420,000
Average selling price	$0.44 each
Variable material and direct labour cost	$0.27 each
Monthly fixed costs	$52,000
Waste sent to landfill	18 tonnes per month
Option A variable cost reduction	$0.03 each
Option A landfill reduction	10 tonnes per month
Option B expected sales increase	16%

13(a) Explain how ReLoop adds value by operating in a circular economy model. **[4]**

13(b) Calculate ReLoop's current monthly contribution before fixed costs and its current monthly profit. **[6]**

13(c) Analyse how Option A would change the balance of labour, capital, and sustainability in ReLoop. **[6]**

13(d) Recommend which option ReLoop should choose. Justify your answer with quantitative and qualitative evidence. **[8]**

Section D - Extended response (12 marks)

Develop a balanced argument and finish with a clear judgment.

14. Discuss whether stricter environmental regulation helps or hinders business growth in the long term. **[12]**

- Teacher answer key begins on the next page.

- Award credit for any other valid answer that is accurately applied to the worksheet context.

Teacher answer key and marking guidance

- Award credit for any other valid response that is accurately applied to the stimulus or business context.

- For calculation questions, award method marks where setup and workings are correct even if there is an arithmetic slip.

- For evaluation questions, reserve the top marks for balanced analysis and a clearly supported final judgment.

Section A answers

Q	Ans	Reason
1	**A**	Circular models emphasize reuse, recovery, and waste reduction.
2	**B**	Automated equipment is a man-made resource used in production, so it is capital.
3	**B**	The technicians provide skilled labour to operate and interpret the technology.
4	**D**	Government regulation is an external legal factor.
5	**A**	Contribution equals selling price minus variable cost, so lower variable cost raises contribution.
6	**B**	Reusing waste converts a by-product into a source of value.
7	**A**	If demand expands too quickly, the factory may face capacity pressure and more defects.
8	**D**	Sustainable growth considers long-term business performance alongside wider impacts.

Section B marking guidance

Q9 [4]

Explain how by-products can be turned into a source of value in manufacturing.

Indicative answer:

- A by-product such as plastic waste can be reused, recycled, or sold instead of being discarded.

- This may reduce disposal cost, lower material cost, and improve the firm's sustainability reputation.

Marking guidance: 1-2 marks for a simple relevant explanation; 3-4 marks for a clearly developed answer that is applied to the context.

Q10 [4]

Distinguish between economic growth and sustainable growth in a manufacturing context.

Indicative answer:

- Economic growth focuses on higher output, sales, or profit over time.

- Sustainable growth also considers whether the business can grow without damaging environmental systems, exhausting resources, or harming stakeholders.

- The second concept is broader because it includes long-term environmental and social viability.

Marking guidance: Award up to 2 marks per clear difference. Full marks require accurate terminology and an applied example or business context.

Q11 [4]

Explain one possible impact of stricter environmental laws on production decisions.

Indicative answer:

- Stricter laws may force the business to redesign materials, invest in cleaner technology, or reduce waste.

- This can raise short-term costs but may also increase efficiency and reduce future risk.

Marking guidance: 1-2 marks for a simple relevant explanation; 3-4 marks for a clearly developed answer that is applied to the context.

Q12 [4]

Explain why highly skilled labour may be a source of competitive advantage in a circular manufacturing firm.

Indicative answer:

- Highly skilled workers can manage advanced sorting, quality control, and process improvement more effectively.

- This can raise efficiency, reduce defects, and help the business innovate faster than rivals.

Marking guidance: 1-2 marks for a simple relevant explanation; 3-4 marks for a clearly developed answer that is applied to the context.

Section C marking guidance

Q13(a) [4]

Explain how ReLoop adds value by operating in a circular economy model.

Indicative answer:

- ReLoop turns recycled material into food-grade containers that customers value for both practical use and lower environmental impact.

- The circular model can reduce waste, support brand differentiation, and meet demand from sustainability-focused buyers.

Marking guidance: 1-2 marks for a simple relevant explanation; 3-4 marks for a clearly developed answer that is applied to the context.

Q13(b) [6]

Calculate ReLoop's current monthly contribution before fixed costs and its current monthly profit.

Indicative answer:

- Contribution per container = $0.44 - $0.27 = $0.17.

- Monthly contribution = 420,000 x $0.17 = $71,400.

- Monthly profit = $71,400 - $52,000 = $19,400.

Marking guidance: Award method marks for correct setup and intermediate workings. Full marks require both correct calculations and accurate interpretation of the results.

Q13(c) [6]

Analyse how Option A would change the balance of labour, capital, and sustainability in ReLoop.

Indicative answer:

- Option A increases capital intensity because more production performance depends on technology.

- Routine labour needs may fall in relative importance, while the need for skilled technical labour rises.

- Lower variable cost improves contribution, and less waste sent to landfill strengthens sustainability performance and reputation.

- The investment may also improve consistency and quality if sorting accuracy rises.

Marking guidance: 1-2 marks for basic analysis, 3-4 for some development with application, and 5-6 for well-developed analysis using relevant data and business context.

Q13(d) [8]

Recommend which option ReLoop should choose. Justify your answer with quantitative and qualitative evidence.

Indicative answer:

- Option A reduces variable cost by $0.03 x 420,000 = $12,600 per month and also reduces landfill waste significantly.

- Option B could raise sales by 16%, equal to 67,200 extra containers. At current contribution of $0.17 each, that adds about $11,424 per month, but the result depends on capacity and quality being maintained.

- Option A creates a durable efficiency gain and supports sustainability goals; Option B may create growth but with operational risk.

- A balanced answer will often recommend Option A because it strengthens margins, sustainability, and long-term competitiveness, unless demand is the business's main constraint.

Marking guidance: 1-2 marks for limited comments, 3-4 for some analysis, 5-6 for balanced analysis with some judgment, and 7-8 for a well-supported recommendation or evaluation.

Section D marking guidance

Q14 [12]

Discuss whether stricter environmental regulation helps or hinders business growth in the long term.

Indicative content:

- Stricter environmental rules can hinder short-term growth because firms may face higher compliance cost, new investment needs, and operational adjustment.

- They can help long-term growth by forcing innovation, improving efficiency, reducing waste, and building trust with customers and regulators.

- Regulation can also create a fairer competitive environment if all firms are held to similar standards.

- The impact depends on industry, timing, the cost of transition, and whether firms can pass on or recover some of the cost through stronger value propositions.

- A strong answer will compare short-term burden with long-term adaptation and strategic benefit.

- A balanced conclusion might argue that regulation often supports healthier long-term growth when firms respond through innovation rather than resistance.

Marking guidance: Use the markband below. Reserve the top band for sustained, well-supported evaluation and a convincing final judgment.

Marks	Descriptor
0	No relevant business knowledge or application.
1-3	Limited knowledge; response is mostly descriptive and weakly applied.
4-6	Some understanding and analysis; application is partial and judgment is weak.
7-9	Good analysis and application with some balance; judgment is supported.
10-12	Strong, sustained evaluation; evidence is used well and the final judgment is clear and convincing.