

Answers to **Multiple Choice** Questions

1. d
2. c
3. c
4. a
5. c
6. c
7. b
8. b
9. d
10. b
11. c
12. a
13. d
14. c
15. d
16. a
17. d
18. c
19. b
20. c
21. a
22. b
23. d
24. c
25. a

Answers to **Numerical Response** Questions

1. 2, 4, 3, 1
2. 2, 4, 1, 5
3. 4, 3, 2, 1
4. 3, 2, 1, 4
5. 2, 1, 3, 4

Answers to **Written Response** Question

1. a) The following is a guide that you could use to evaluate students' experimental designs:

Procedure

1. Use the wax pencil to label the test tubes A, B, and C. Test tube C will act as the control test.
2. Use a clean medicine dropper to add 2 mL (2 full medicine droppers) of cream to each test tube.

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3. Use a clean medicine dropper to add 1 mL of sodium carbonate solution to each test tube.
4. Add a few drops of dish soap to test tube B.
5. Use a clean medicine dropper to add 1 mL of distilled water to test tube C.
6. Use a clean medicine dropper to add 10 drops of phenolphthalein solution to each test tube.
NOTE: It might be necessary to add a bit more sodium carbonate to the test tubes to change the pH to a weak base (phenolphthalein should be pink in each test tube).
7. Add 1 mL of lipase solution to test tube A and test tube B just before placing them in the warm water bath.
8. Cover each test tube with a small piece of plastic sandwich wrap and shake to mix the solution in each tube.
9. Record the colour of the mixture in each test tube in the chart below.
10. Place the test tubes in a water bath or incubator at 37°C for 15 minutes. Record the colour of the mixture in each test tube after the 15 minutes in the warm water bath.

(10 marks)

b)

- Whole milk is the source of lipids (fats).
- Soap is an emulsifier.
- Sodium bicarbonate provides a slightly basic pH for the action of the enzyme (lipase).
- The hot water bath maintains the optimum temperature for the enzyme lipase).

(4 marks)

c)

Test Tube	Ingredients	Colour after digestion	Interpretation
A	2 mL cereal cream 1 mL sodium carbonate 1 mL lipase solution 10 drops phenolphthalein	just started to turn from pink to colour of milk	some of the lipid was being digested, forming fatty acids that change the pH of the solution from basic to acidic
B	2 mL cereal cream 1 mL sodium carbonate 1 mL lipase solution soap 10 drops phenolphthalein	quickly turned from pink to colour of milk	most of the lipid in the milk was digested because the soap emulsified the lipids, increasing the surface area for lipase to digest the lipids and forming fatty acids that changed the pH from basic to acidic

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C	2 mL cereal cream 1 mL sodium carbonate 1 mL distilled water 10 drops phenolphthalein	stayed pink	this was the control test; no lipase was added so no reaction would take place
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(6 marks)

d) Test tube B would show the fastest reaction. This is because it not only contained the enzyme to digest lipids, but also contained soap. The soap emulsified the fats, increasing the surface area for the action of lipase. Although lipase will digest the lipids in Test Tube A, without an emulsifier (without increasing the surface area), the reaction is much slower.

(2 marks)