ExamPath

CLASS 9 MATHEMATICS · FBISE PATTERN · FULL-BOOK MOCK PAPER

Mock Exam 2: all 11 units

Total 75 marks · 3 hours Section A: **48 MCQs × 0.75 = 36** (1 hour 20 minutes) Section B: **7 × 3 = 21**

Section C: **3 × 6 = 18** (B and C: 1 hour 40 minutes)

Name: _____ Date: _____ Marks: / 75

Section A: circle one answer for each question; questions 33–48 are based on four scenarios. Sections B and C start on a new page. The answer key and model answers are on the last pages. This practice paper follows the structure of the FBISE SSC-I Mathematics model paper. It is not an official FBISE paper.

Section A · 48 MCQs (36 marks) · 1 hour 20 minutes

Part 1 · Questions 1–32

1. Which of the following is a rational number?

(A) π (B) $\sqrt{3} + 1$

(C) $\sqrt{2}$ (D) $\sqrt{(16/25)}$

2. What is the value of $81^{-3/4}$?

(A) 27 (B) $-1/27$

(C) $1/27$ (D) -27

3. $\sqrt{50} + \sqrt{18}$ simplifies to:

(A) $4\sqrt{2}$ (B) $8\sqrt{2}$

(C) $15\sqrt{2}$ (D) $\sqrt{68}$

4. The population of a city is 7 200 000. In scientific notation this is:

(A) 7.2×10^7 (B) 72×10^5

(C) 7.2×10^6 (D) 7.2×10^5

5. If $\log_x 81 = 4$, then $x = ?$

(A) 4 (B) 20.25

(C) 9 (D) 3

6. $\log 5 + \log 20 = ?$

(A) 100 (B) 2

(C) 1 (D) $\log 25$

7. If $A = \{1, 3, 5, 7\}$ and $B = \{3, 4, 5\}$, then $A \cup B$ is:

(A) $\{1, 7\}$ (B) $\{4\}$

(C) $\{3, 5\}$ (D) $\{1, 3, 4, 5, 7\}$

8. If A = {1, 2, 3} and B = {4, 5}, the number of binary relations from A to B is:

(A) 12 (B) 32
(C) 64 (D) 6

9. R = {(x, y) : y = x + 2} on the set {1, 2, 3, 4, 5}. Which ordered pair belongs to R?

(A) (3, 6) (B) (4, 2)
(C) (1, 4) (D) (2, 4)

10. Factorise $9x^2 - 16y^2$.

(A) $(3x - 4y)(3x + 4y)$ (B) $(9x - 16y)(x + y)$
(C) $(3x + 4y)^2$ (D) $(3x - 4y)^2$

11. If $(x + 2)$ is a factor of $x^3 + kx + 4$, then k = ?

(A) -6 (B) 6
(C) -2 (D) 2

12. The square root of $x^2 + 10x + 25$ is:

(A) $\pm(x + 5)$ (B) $x + 25$
(C) $\pm(x + 10)$ (D) $\pm(x - 5)$

13. Solve $(x + 1)/3 = (x - 2)/2$.

(A) $x = -8$ (B) $x = 8$
(C) $x = 1$ (D) $x = 4$

14. The solution of $-3 \le 2x + 1 < 7$ is:

(A) $-2 \le x < 3$ (B) $-1 \le x < 4$
(C) $-2 < x \le 3$ (D) $x < 3$

15. Two numbers add up to 40 and their difference is 8. What is the larger number?

(A) 20 (B) 16
(C) 32 (D) 24

16. $5\pi/6$ radians in degrees is:

(A) 300° (B) 150°
(C) 120° (D) 135°

17. $\sin 30° + \cos 60°$ = ?

(A) 1 (B) 0
(C) 1/2 (D) $\sqrt{3}$

18. If $\sin\theta = 3/5$ and θ is acute, then $\cos\theta$ = ?

(A) 4/5 (B) 3/4
(C) 5/4 (D) 2/5

19. The distance from the origin to the point (5, 12) is:

(A) 7
(B) √119
(C) 17
(D) 13

20. M(2, 1) is the midpoint of AB, where A is (−1, 4). What are the coordinates of B?

(A) (−4, 7)
(B) (3, −3)
(C) (0.5, 2.5)
(D) (5, −2)

21. The point (a, 3) is 5 units from (1, 0). Which of these is a possible value of a?

(A) 4
(B) 2
(C) 6
(D) 5

22. The equation of the line with gradient 3 and y-intercept −2 is:

(A) y = −3x − 2
(B) y = −2x + 3
(C) y = 3x + 2
(D) y = 3x − 2

23. The lines y = 4x − 1 and y = 4x + 7 are:

(A) perpendicular
(B) the same line
(C) parallel
(D) intersecting at (0, −1)

24. The gradient of the line 2x + 5y = 10 is:

(A) −2/5
(B) −5/2
(C) 2/5
(D) 5/2

25. The sum of the interior angles of an octagon is:

(A) 1080°
(B) 1440°
(C) 1260°
(D) 900°

26. Each exterior angle of a regular polygon is 30°. How many sides does it have?

(A) 12
(B) 6
(C) 10
(D) 15

27. Two similar cuboids have volumes in the ratio 8 : 125. What is the ratio of their surface areas?

(A) 16 : 625
(B) 4 : 25
(C) 8 : 125
(D) 2 : 5

28. The in-centre of a triangle is the point where the ___ meet.

(A) altitudes
(B) angle bisectors
(C) perpendicular bisectors of the sides
(D) medians

29. To construct a triangle you are given two angles of 47° and 68° and one side. What is the third angle?

(A) 75° (B) 115°
(C) 65° (D) 55°

30. Which point of a triangle is the same distance from all three vertices?

(A) Circumcentre (B) In-centre
(C) Orthocentre (D) Centroid

31. The median of 12, 5, 9, 20, 7 and 15 is:

(A) 11.33 (B) 10.5
(C) 12 (D) 9

32. A bag has 4 red, 5 blue and 3 green balls. One ball is taken at random. What is P(not blue)?

(A) 5/12 (B) 1/4
(C) 7/12 (D) 1/3

Part 2 · Scenario-based questions 33–48

Scenario 1: Sets (Unit 3) · Questions 33–36

In a class of 40 students, 22 play cricket, 18 play football and 7 play both games. Draw a Venn diagram to help you.

33. How many students play only cricket?

(A) 15 (B) 22
(C) 11 (D) 29

34. How many students play only football?

(A) 18 (B) 15
(C) 25 (D) 11

35. How many students play at least one of the two games?

(A) 40 (B) 47
(C) 29 (D) 33

36. How many students play neither game?

(A) 7 (B) 5
(C) 0 (D) 9

Scenario 2: Similar figures (Unit 9) · Questions 37–40

A rectangular photograph measures 15 cm by 10 cm. It is enlarged to a similar photograph whose longer side is 24 cm.

37. What is the scale factor of the enlargement?

(A) 2.4
(B) 1.5
(C) 0.625
(D) 1.6

38. What is the shorter side of the enlarged photograph?

(A) 19 cm
(B) 16 cm
(C) 14 cm
(D) 15 cm

39. What is the area of the enlarged photograph?

(A) 600 cm^2
(B) 384 cm^2
(C) 256 cm^2
(D) 240 cm^2

40. What is the ratio of the area of the original photograph to the enlarged one?

(A) 5 : 8
(B) 125 : 512
(C) 25 : 64
(D) 8 : 5

Scenario 3: Probability (Unit 11) · Questions 41–44

A fair spinner has 8 equal sectors numbered 1 to 8.

41. What is the probability of spinning an even number?

(A) 5/8
(B) 3/8
(C) 1/2
(D) 1/4

42. What is the probability of spinning a multiple of 3?

(A) 3/8
(B) 1/4
(C) 1/8
(D) 1/3

43. The spinner is spun 200 times. What is the expected number of times it lands on 8?

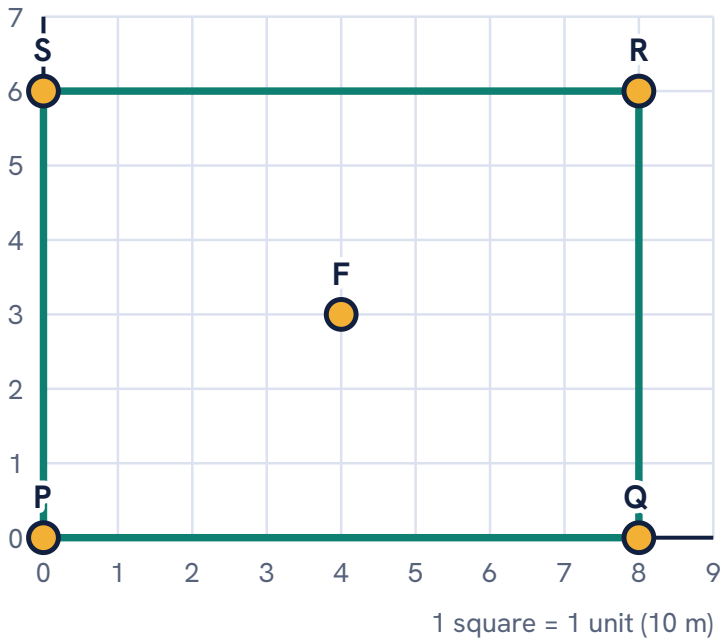
(A) 25
(B) 8
(C) 40
(D) 20

44. In 80 spins, the number 5 appeared 14 times. What is the relative frequency of a 5?

(A) 0.14
(B) 0.175
(C) 0.125
(D) 0.2

Scenario 4: Coordinate geometry (Unit 7 and Unit 8) · Questions 45–48

A rectangular park has corners P(0, 0), Q(8, 0), R(8, 6) and S(0, 6). A fountain F stands at (4, 3). Each square on the plan is 10 m, so 1 unit = 10 m.



1 square = 1 unit (10 m)

45. How long is the diagonal path PR, in units?

(A) 14
(B) 12
(C) 10
(D) 8

46. What is the midpoint of the diagonal PR?

(A) (4, 4)
(B) (8, 6)
(C) (4, 3)
(D) (3, 4)

47. What is the gradient of the diagonal QS?

(A) −4/3
(B) 3/4
(C) −3/4
(D) 4/3

48. How far is the fountain F from the corner Q, in units?

(A) 6
(B) 5
(C) 3
(D) 4

SECTIONS B AND C · 39 MARKS · TIME: 1 HOUR 40 MINUTES

Answer every question. In each question attempt either (i) or (ii). Show all your working.

Section B · Short questions (7 × 3 = 21 marks)

Question 1 · 3 marks · answer (i) OR (ii)

(i) Evaluate $32^{3/5} \times 27^{-2/3} \div 4^{1/2}$.

OR

(ii) Find the equation of the line through $(-1, 4)$ and $(3, -4)$ in the form $ax + by + c = 0$.

Question 2 · 3 marks · answer (i) OR (ii)

(i) Solve $|x/2 - 1| = 3$.

OR

(ii) A coin of radius 2 cm rolls around the outside of a fixed circular plate of radius 5 cm, always touching it. Describe the locus of the centre of the coin.

Question 3 · 3 marks · answer (i) OR (ii)

(i) Find the angle that the line through $(0, 2)$ and $(3, 2 + \sqrt{3})$ makes with the positive x-axis.

OR

(ii) Prove that $\cos^4\theta - \sin^4\theta = \cos^2\theta - \sin^2\theta$.

Question 4 · 3 marks · answer (i) OR (ii)

(i) The volume of a box is $x^3 + 4x^2 + x - 6$ cm^3. Show that $(x - 1)$ is a factor, factorise completely, and find the volume when $x = 4$.

OR

(ii) Solve $(x + 4)/3 \le (2x - 1)/5$ and show the solution on a number line.

Question 5 · 3 marks · answer (i) OR (ii)

(i) A factory tested 500 bulbs and found 15 faulty. (a) Find the relative frequency of a faulty bulb. (b) Estimate the number of faulty bulbs in a batch of 12 000.

OR

(ii) The acidity of a liquid is $\text{pH} = -\log[H^+]$. (a) Find the pH when $[H^+] = 10^{-4}$. (b) A juice has pH 3 and milk has pH 5. How many times greater is $[H^+]$ in the juice?

Question 6 · 3 marks · answer (i) OR (ii)

(i) Two similar boxes have heights 10 cm and 15 cm. The small box has a volume of 400 cm^3. Find the volume of the large box and the ratio of their surface areas.

OR

(ii) A ramp 6 m long rises 1.5 m. Find the angle the ramp makes with the ground and its horizontal length, to 2 decimal places.

Question 7 · 3 marks · answer (i) OR (ii)

(i) A = {1, 2, 3} and B = {2, 4, 6, 8}. The relation R from A to B is "b = 2a". List R, state its domain and range, and say whether 8 is in the range.

OR

(ii) An aircraft flies 300 km on a bearing of 090° and then 400 km on a bearing of 180°. Find its distance from the start and its bearing from the start.

Section C · Long questions (3 × 6 = 18 marks)

Question 8 · 6 marks · answer (i) OR (ii)

(i) Let A = {1, 2}, B = {2, 3, 4} and C = {3, 4, 5}.
(a) Verify that A ∪ (B ∩ C) = (A ∪ B) ∩ (A ∪ C). (4 marks)
(b) Find n(A × B). (2 marks)

OR

(ii) Two similar ice-cream cones have heights 9 cm and 12 cm.
(a) Find the ratio of their curved surface areas. (2 marks)
(b) The small cone has volume 54π cm^3. Find the volume of the large cone. (2 marks)
(c) The small cone's curved surface area is 27π cm^2. Find the large cone's. (2 marks)

Question 9 · 6 marks · answer (i) OR (ii)

(i) For $p = 2x^2 - 8$ and $q = x^2 + 4x + 4$:
(a) Factorise p and q. (2 marks)
(b) Find the HCF and LCM. (2 marks)
(c) Verify that p × q = HCF × LCM. (2 marks)

OR

(ii) From a point A on level ground, the angle of elevation of the top of a building is 30°. From a point B, 40 m closer to the building, the angle of elevation is 60°. Find the height of the building and the distance of B from it.

Question 10 · 6 marks · answer (i) OR (ii)

(i) Construct triangle PQR with QR = 6 cm, angle Q = 60° and angle R = 45°.
(a) Find angle P. (1 mark)
(b) Write the steps of the construction. (2 marks)
(c) Construct the circumcircle and state where the circumcentre lies, with a reason. (3 marks)

OR

(ii) The monthly electricity bills of five houses are Rs 2400, 3100, 2800, 3500 and 2700.
(a) Find the mean bill. (2 marks)
(b) A sixth house is added and the mean becomes Rs 3000. Find the sixth bill. (2 marks)
(c) Find the median of the six bills. (2 marks)

Answer key

Mock Exam 2 · Section A marks = number correct × 0.75

1 D	**2** C	**3** B	**4** C	**5** D
6 B	**7** D	**8** C	**9** D	**10** A
11 C	**12** A	**13** B	**14** A	**15** D
16 B	**17** A	**18** A	**19** D	**20** D
21 D	**22** D	**23** C	**24** A	**25** A
26 A	**27** B	**28** B	**29** C	**30** A
31 B	**32** C	**33** A	**34** D	**35** D
36 A	**37** D	**38** B	**39** B	**40** C
41 C	**42** B	**43** A	**44** B	**45** C
46 C	**47** C	**48** B		

Section A explanations

1. D. √(16/25) · Unit 1
√(16/25) = 4/5, a ratio of two integers. √2, π and √3 + 1 are irrational.

2. C. 1/27 · Unit 1
$81^{3/4} = (\sqrt[4]{81})^3 = 3^3 = 27$, and the negative power gives the reciprocal: 1/27.

3. B. 8√2 · Unit 1
√50 = 5√2 and √18 = 3√2, so the sum is 8√2. Adding under the root (√68) is a common mistake.

4. C. 7.2×10^6 · Unit 2
Move the decimal point 6 places left to get 7.2, so 7.2×10^6. 72×10^5 has the right value but 72 is not between 1 and 10.

5. D. 3 · Unit 2
$\log_x 81 = 4$ means $x^4 = 81$, so x = 3.

6. B. 2 · Unit 2
log 5 + log 20 = log (5 × 20) = log 100 = 2.

7. D. {1, 3, 4, 5, 7} · Unit 3
The union contains every element of A or B, each written once: {1, 3, 4, 5, 7}.

8. C. 64 · Unit 3
A × B has 3 × 2 = 6 ordered pairs. Every binary relation is a subset of A × B, so there are $2^6 = 64$ relations.

9. D. (2, 4) · Unit 3
In (2, 4), y = 2 + 2. (4, 2) is reversed, 6 is not in the set, and in (1, 4) y is 3 more than x.

10. A. (3x − 4y)(3x + 4y) · Unit 4
It is a difference of two squares: $(3x)^2 - (4y)^2 = (3x - 4y)(3x + 4y)$.

11. C. −2 · Unit 4
By the factor theorem, put x = −2 and set it to 0: −8 − 2k + 4 = 0, so k = −2.

12. **A. ±(x + 5)** · Unit 4
$x^2 + 10x + 25 = (x + 5)^2$, so its square root is ±(x + 5).

13. **B. x = 8** · Unit 5
Cross-multiply: 2(x + 1) = 3(x − 2), so 2x + 2 = 3x − 6 and x = 8.

14. **A. −2 ≤ x < 3** · Unit 5
Subtract 1: −4 ≤ 2x < 6. Divide by 2: −2 ≤ x < 3.

15. **D. 24** · Unit 5
Let the larger be x. Then x + (x − 8) = 40, so 2x = 48 and x = 24. The numbers are 24 and 16.

16. **B. 150°** · Unit 6
5π/6 × 180°/π = 150°.

17. **A. 1** · Unit 6
sin 30° = 1/2 and cos 60° = 1/2, so the sum is 1.

18. **A. 4/5** · Unit 6
$\cos^2\theta = 1 - \sin^2\theta = 1 - 9/25 = 16/25$, and cos θ is positive for an acute angle, so cos θ = 4/5.

19. **D. 13** · Unit 7
$\sqrt{(5^2 + 12^2)} = \sqrt{169} = 13$.

20. **D. (5, −2)** · Unit 7
B = (2 × 2 − (−1), 2 × 1 − 4) = (5, −2). Check: ((−1 + 5)/2, (4 − 2)/2) = (2, 1).

21. **D. 5** · Unit 7
$(a - 1)^2 + 3^2 = 25$, so $(a - 1)^2 = 16$ and a − 1 = ±4. So a = 5 or a = −3; only 5 is among the options.

22. **D. y = 3x − 2** · Unit 8
Use y = mx + c with m = 3 and c = −2.

23. **C. parallel** · Unit 8
They have the same gradient, 4, but different y-intercepts, so they never meet.

24. **A. −2/5** · Unit 8
Rearrange: y = −(2/5)x + 2, so the gradient is −2/5.

25. **A. 1080°** · Unit 9
(8 − 2) × 180° = 1080°.

26. **A. 12** · Unit 9
Exterior angles add up to 360°, so n = 360° ÷ 30° = 12.

27. **B. 4 : 25** · Unit 9
Volume ratio 8 : 125 = $2^3 : 5^3$, so the length ratio is 2 : 5 and the area ratio is 4 : 25.

28. **B. angle bisectors** · Unit 10
The three angle bisectors meet at the in-centre, which is the centre of the inscribed circle.

29. **C. 65°** · Unit 10
180° − 47° − 68° = 65°.

30. **A. Circumcentre** · Unit 10
The circumcentre lies on the perpendicular bisector of every side, so it is equidistant from all three vertices.

31. **B. 10.5** · Unit 11
In order: 5, 7, 9, 12, 15, 20. The two middle values are 9 and 12, so the median is (9 + 12)/2 = 10.5.

32. **C. 7/12** · Unit 11
There are 12 balls and 7 are not blue, so P = 7/12. Or 1 − 5/12 = 7/12.

33. **A. 15** · Unit 3
22 − 7 = 15.

34. **D. 11** · Unit 3
18 − 7 = 11.

35. **D. 33** · Unit 3
n(C ∪ F) = 22 + 18 − 7 = 33. Adding 22 + 18 counts the 7 students twice.

36. **A. 7** · Unit 3
40 − 33 = 7.

37. **D. 1.6** · Unit 9
24 ÷ 15 = 1.6.

38. **B. 16 cm** · Unit 9
10 × 1.6 = 16 cm. Adding 9 cm to each side (giving 19 cm) does not keep the shape similar.

39. **B. 384 cm^2** · Unit 9
The original area is 15 × 10 = 150 cm^2. Areas scale by 1.6^2 = 2.56, so 150 × 2.56 = 384 cm^2. Check: 24 × 16 = 384.

40. **C. 25 : 64** · Unit 9
The length ratio is 15 : 24 = 5 : 8, so the area ratio is 25 : 64.

41. **C. 1/2** · Unit 11
Even numbers: 2, 4, 6, 8, which is 4 of 8, so P = 1/2.

42. **B. 1/4** · Unit 11
Multiples of 3: 3 and 6, which is 2 of 8, so P = 1/4.

43. **A. 25** · Unit 11
Expected frequency = 200 × 1/8 = 25.

44. **B. 0.175** · Unit 11
14 ÷ 80 = 0.175. It is close to, but not equal to, the theoretical probability 1/8 = 0.125.

45. **C. 10** · Unit 7
$\sqrt{(8^2 + 6^2)} = \sqrt{100}$ = 10 units, which is 100 m.

46. **C. (4, 3)** · Unit 7
((0 + 8)/2, (0 + 6)/2) = (4, 3), the position of the fountain.

47. **C. −3/4** · Unit 8
m = (6 − 0)/(0 − 8) = −3/4.

48. **B. 5** · Unit 7
$\sqrt{[(8 - 4)^2 + (0 - 3)^2]} = \sqrt{25}$ = 5 units.

Sections B and C: model answers

Both options of each question are answered. Give marks for correct working as well as the final answer. These are model answers, not an official FBISE marking scheme.

Q1 (i) · Unit 1 · Laws of indices

1. $32^{3/5} = (\sqrt[5]{32})^3 = 2^3 = 8$
2. $27^{-2/3} = 1/(\sqrt[3]{27})^2 = 1/9$
3. $4^{1/2} = 2$
4. $8 \times 1/9 \div 2 = 4/9$

Answer: 4/9

Q1 (ii) · Unit 8 · Equation of a line

1. $m = (-4 - 4)/(3 - (-1)) = -8/4 = -2$
2. $y - 4 = -2(x + 1)$, so $y = -2x + 2$.
3. $2x + y - 2 = 0$. Check $(3, -4)$: $6 - 4 - 2 = 0$ ✓

Answer: 2x + y − 2 = 0

Q2 (i) · Unit 5 · Absolute value equation

1. $x/2 - 1 = 3$ gives $x/2 = 4$, so $x = 8$.
2. $x/2 - 1 = -3$ gives $x/2 = -2$, so $x = -4$.

Answer: x = 8 or x = −4

Q2 (ii) · Unit 9 · Locus

1. The centre of the coin is always $5 + 2 = 7$ cm from the centre of the plate.
2. So it moves on a circle with the same centre as the plate and radius 7 cm.

Answer: A circle, concentric with the plate, of radius 7 cm

Q3 (i) · Unit 8 · Angle of a line

1. $m = (2 + \sqrt{3} - 2)/(3 - 0) = \sqrt{3}/3 = 1/\sqrt{3}$
2. $\tan \alpha = 1/\sqrt{3}$, so $\alpha = 30°$.

Answer: 30°

Q3 (ii) · Unit 6 · Trigonometric identity

1. LHS = $(\cos^2\theta - \sin^2\theta)(\cos^2\theta + \sin^2\theta)$ (difference of squares).
2. $\cos^2\theta + \sin^2\theta = 1$, so LHS = $\cos^2\theta - \sin^2\theta$ = RHS.

Answer: LHS = RHS

Q4 (i) · Unit 4 · Factorising a cubic

1. $x = 1$ gives $1 + 4 + 1 - 6 = 0$, so $(x - 1)$ is a factor.
2. $x^3 + 4x^2 + x - 6 = (x - 1)(x^2 + 5x + 6) = (x - 1)(x + 2)(x + 3)$
3. $x = 4$: dimensions 3, 6, 7 cm; volume 126 cm^3. Check: $64 + 64 + 4 - 6 = 126$ ✓

Answer: (x − 1)(x + 2)(x + 3); 126 cm^3

Q4 (ii) · Unit 5 · Inequality on a number line

1. Multiply by 15: $5(x + 4) \le 3(2x - 1)$
2. $5x + 20 \le 6x - 3$, so $23 \le x$.
3. $x \ge 23$: a filled circle at 23 and an arrow to the right.

Answer: x ≥ 23

Q5 (i) · Unit 11 · Relative and expected frequency

1. (a) 15 ÷ 500 = 0.03
2. (b) 12 000 × 0.03 = 360

Answer: (a) 0.03 (b) about 360

Q5 (ii) · Unit 2 · Logarithms in real life

1. (a) pH = −log 10^{-4} = −(−4) = 4
2. (b) Juice: $[H^+] = 10^{-3}$; milk: 10^{-5}. Ratio = $10^{-3} \div 10^{-5} = 100$.

Answer: (a) 4 (b) 100 times

Q6 (i) · Unit 9 · Similar solids

1. k = 15/10 = 3/2
2. Volume = 400 × $(3/2)^3$ = 400 × 27/8 = 1350 cm^3
3. Surface areas: $2^2 : 3^2 = 4 : 9$

Answer: 1350 cm^3; 4 : 9

Q6 (ii) · Unit 6 · Trigonometry in real life

1. sin θ = 1.5/6 = 0.25, so θ ≈ 14.48°.
2. Horizontal length = $\sqrt{(6^2 - 1.5^2)} = \sqrt{33.75} \approx 5.81$ m.

Answer: θ ≈ 14.48°, about 5.81 m

Q7 (i) · Unit 3 · Relations

1. R = {(1, 2), (2, 4), (3, 6)}
2. Domain = {1, 2, 3}; range = {2, 4, 6}.
3. 8 is not in the range, because 8 = 2 × 4 and 4 is not in A.

Answer: R = {(1, 2), (2, 4), (3, 6)}; 8 is not in the range

Q7 (ii) · Unit 6 · Bearings

1. It is 300 km east and 400 km south of the start. Distance = $\sqrt{(300^2 + 400^2)} = 500$ km.
2. The angle east of south is $\tan^{-1}(300/400) \approx 36.9°$.
3. Bearing = 180° − 36.9° ≈ 143.1°, about 143°.

Answer: 500 km on a bearing of about 143°

Q8 (i) · Unit 3 · Laws of sets

1. (a) B ∩ C = {3, 4}, so A ∪ (B ∩ C) = {1, 2, 3, 4}.
2. A ∪ B = {1, 2, 3, 4} and A ∪ C = {1, 2, 3, 4, 5}; their intersection is {1, 2, 3, 4}. Both sides are equal.
3. (b) n(A × B) = n(A) × n(B) = 2 × 3 = 6.

Answer: (a) both sides = {1, 2, 3, 4} (b) 6

Q8 (ii) · Unit 9 · Similar solids

1. Length ratio 9 : 12 = 3 : 4.
2. (a) $3^2 : 4^2 = 9 : 16$
3. (b) 54π × $(4/3)^3$ = 54π × 64/27 = 128π cm^3
4. (c) 27π × 16/9 = 48π cm^2

Answer: (a) 9 : 16 (b) 128π cm^3 (c) 48π cm^2

Q9 (i) · Unit 4 · HCF and LCM

1. (a) p = 2(x − 2)(x + 2); q = $(x + 2)^2$.
2. (b) HCF = x + 2; LCM = 2(x − 2)$(x + 2)^2$.
3. (c) p × q = 2(x − 2)$(x + 2)^3$, and HCF × LCM = (x + 2) × 2(x − 2)$(x + 2)^2$ = 2(x − 2)$(x + 2)^3$. Verified.

Answer: HCF = x + 2; LCM = 2(x − 2)$(x + 2)^2$

Q9 (ii) · Unit 6 · Angles of elevation

1. Let x be the distance from B to the building and h its height.
2. From B: h = x tan 60° = x√3. From A: h = (x + 40) tan 30° = (x + 40)/√3.
3. x√3 = (x + 40)/√3, so 3x = x + 40 and x = 20 m.
4. h = 20√3 ≈ 34.64 m.

Answer: Height ≈ 34.64 m; B is 20 m from the building

Q10 (i) · Unit 10 · Construction: circumcircle

1. (a) Angle P = 180° − 60° − 45° = 75°.
2. (b) Draw QR = 6 cm. At Q draw an angle of 60° and at R an angle of 45°; the arms meet at P.
3. (c) Draw the perpendicular bisectors of PQ and QR. They meet at O. With centre O and radius OP, draw the circle through P, Q and R.
4. All angles (60°, 45°, 75°) are acute, so the circumcentre O lies inside the triangle.

Answer: (a) 75° (c) the circumcentre lies inside the triangle

---

Q10 (ii) · Unit 11 · Mean in real life

1. (a) Sum = 14 500, mean = 14 500 ÷ 5 = Rs 2900.
2. (b) New total = 6 × 3000 = 18 000, so the sixth bill = 18 000 − 14 500 = Rs 3500.
3. (c) In order: 2400, 2700, 2800, 3100, 3500, 3500. Median = (2800 + 3100)/2 = Rs 2950.

Answer: (a) Rs 2900 (b) Rs 3500 (c) Rs 2950

Free practice from ExamPath (exampath.org). You may print and share for study. Take this mock online with a timer and a result by unit at exampath.org.