ExamPath

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

Mock Exam 1: 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 these numbers is irrational?

(A) √49 (B) 0.25
(C) 22/7 (D) √11

2. What is the value of $27^{2/3}$?

(A) 18 (B) 9
(C) 3 (D) 6

3. When the denominator is rationalised, 6/√3 equals:

(A) √3/2 (B) 6√3
(C) 3√2 (D) 2√3

4. A virus is about 0.0000405 mm wide. In scientific notation this is:

(A) 4.05×10^{5} mm (B) 4.05×10^{-5} mm
(C) 4.05×10^{-4} mm (D) 40.5×10^{-6} mm

5. $\log_2 32 = ?$

(A) 16 (B) 6
(C) 5 (D) 4

6. Given log 2 = 0.3010 and log 3 = 0.4771, the value of log 12 is:

(A) 1.2552 (B) 0.7781
(C) 0.1436 (D) 1.0791

7. If A = {1, 2} and B = {a, b, c}, how many ordered pairs are there in A × B?

(A) 8 (B) 9
(C) 6 (D) 5

8. If $(2x - 1, y + 3) = (5, 7)$, then (x, y) is:

(A) $(4, 3)$ (B) $(3, 10)$
(C) $(3, 4)$ (D) $(2, 4)$

9. For the relation $R = \{(1, 2), (2, 3), (3, 4)\}$, the range of R is:

(A) $\{1, 4\}$ (B) $\{1, 2, 3\}$
(C) $\{2, 3, 4\}$ (D) $\{1, 2, 3, 4\}$

10. A shop's profit is modelled by $x^2 - 7x + 12$. In factorised form this is:

(A) $(x - 3)(x - 4)$ (B) $(x + 3)(x + 4)$
(C) $(x - 2)(x - 6)$ (D) $(x - 12)(x + 1)$

11. What is the remainder when $x^3 - 2x^2 + 5$ is divided by $(x - 2)$?

(A) -11 (B) 0
(C) 5 (D) 21

12. The LCM of $4x^2y$ and $6xy^3$ is:

(A) $24x^3y^4$ (B) $12xy$
(C) $12x^2y^3$ (D) $2xy$

13. Solve $3(x - 2) = 2x + 5$.

(A) $x = 3$ (B) $x = -1$
(C) $x = 7$ (D) $x = 11$

14. The solution of $5 - 2x > 11$ is:

(A) $x > -3$ (B) $x < -3$
(C) $x < 3$ (D) $x > 3$

15. The solutions of $|2x - 1| = 7$ are:

(A) $x = 4$ or $x = -3$ (B) $x = 4$ only
(C) $x = 4$ or $x = 3$ (D) $x = -4$ or $x = 3$

16. $120°$ in radians is:

(A) $\pi/3$ (B) $5\pi/6$
(C) $3\pi/2$ (D) $2\pi/3$

17. A sector has radius 6 cm and central angle $\pi/3$ radians. Its arc length is:

(A) 2π cm (B) $\pi/2$ cm
(C) 6π cm (D) 3π cm

18. A boat sails from a jetty on a bearing of $070°$. On what bearing must it sail to return to the jetty?

(A) $160°$ (B) $250°$
(C) $290°$ (D) $110°$

19. The distance between (−2, 3) and (4, −5) is:

(A) 14
(B) √28
(C) 10
(D) 8

20. The midpoint of (3, −4) and (−7, 10) is:

(A) (5, −7)
(B) (−2, 3)
(C) (−4, 6)
(D) (2, −3)

21. The points A(1, 2), B(3, 6) and C(5, k) lie on one straight line. What is k?

(A) 8
(B) 12
(C) 10
(D) 9

22. The gradient of the line through (2, 5) and (6, −3) is:

(A) −2
(B) 1/2
(C) 2
(D) −1/2

23. The y-intercept of the line 3x − 4y + 12 = 0 is:

(A) −3
(B) −4
(C) 4
(D) 3

24. A line is perpendicular to y = 2x + 1. Its gradient is:

(A) −1/2
(B) 2
(C) 1/2
(D) −2

25. Each interior angle of a regular hexagon is:

(A) 108°
(B) 120°
(C) 150°
(D) 135°

26. Two similar triangles have corresponding sides of 4 cm and 10 cm. The ratio of their areas is:

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

27. A student claims "$n^2 + n + 41$ is prime for every whole number n." For n = 40 it gives $1681 = 41^2$. What does this show?

(A) One counterexample is enough to disprove the claim
(B) The claim is true for most numbers, so it is accepted
(C) The claim is proved
(D) Nothing, because only deduction can disprove a claim

28. In triangle ABC, the median AD is 15 cm long and G is the centroid. What is AG?

(A) 10 cm
(B) 12 cm
(C) 7.5 cm
(D) 5 cm

29. Where does the circumcentre of a right-angled triangle lie?

(A) At the midpoint of the hypotenuse
(B) Inside the triangle, away from the sides
(C) Outside the triangle
(D) At the vertex of the right angle

30. Sides of 6 cm and 4 cm are given, with an angle of 50° opposite the 4 cm side. How many triangles can be constructed? (sin 50° ≈ 0.766)

(A) Exactly two
(B) Infinitely many
(C) None
(D) Exactly one

31. The mean of 7, 9, 12, 15 and 17 is:

(A) 12
(B) 11
(C) 10
(D) 15

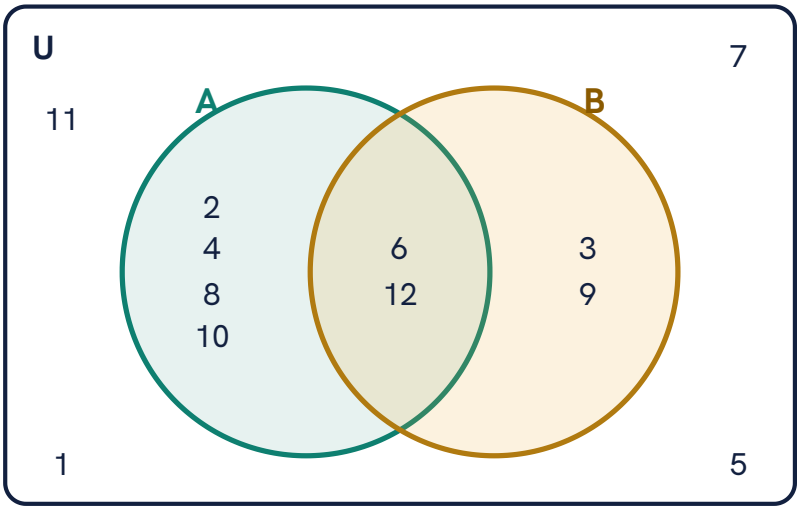
32. A fair die is rolled once. What is the probability of getting a number greater than 4?

(A) 2/3
(B) 1/3
(C) 1/6
(D) 1/2

Part 2 · Scenario-based questions 33–48

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

U = {1, 2, 3, ..., 12}. A is the set of multiples of 2 in U, and B is the set of multiples of 3 in U. The Venn diagram shows the sets.



33. What is A ∩ B?

(A) {6}
(B) {6, 12}
(C) {3, 9}
(D) {2, 3, 4, 6, 8, 9, 10, 12}

34. What is A − B?

(A) {6, 12}
(B) {2, 4, 6, 8, 10, 12}
(C) {3, 9}
(D) {2, 4, 8, 10}

35. What is (A ∪ B)′?

(A) {6, 12}
(B) {1, 5, 7, 11}
(C) {1, 5, 7}
(D) {5, 7, 11}

36. What is n(A ∪ B)?

(A) 4
(B) 10
(C) 6
(D) 8

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

A company sells juice in two similar cylindrical tins.

Tin	Radius	Height
Small	3 cm	8 cm
Large	4.5 cm	12 cm

Leave answers in terms of π where needed.

37. What is the linear scale factor from the small tin to the large tin?

(A) 1.25
(B) 2.25
(C) 1.5
(D) 3.375

38. The curved surface area of the small tin is 48π cm^2. What is the curved surface area of the large tin?

(A) 96π cm^2
(B) 72π cm^2
(C) 162π cm^2
(D) 108π cm^2

39. The volume of the small tin is 72π cm^3. What is the volume of the large tin?

(A) 216π cm^3
(B) 243π cm^3
(C) 162π cm^3
(D) 108π cm^3

40. What is the ratio of the volume of the small tin to the volume of the large tin?

(A) 8 : 27
(B) 4 : 9
(C) 2 : 3
(D) 3 : 2

Scenario 3: Statistics and probability (Unit 11) · Questions 41–44

The table shows the marks (out of 50) of the students in a class test.

Marks	0–10	10–20	20–30	30–40	40–50
Number of students (f)	4	6	10	6	4

41. How many students took the test?

(A) 25
(B) 5
(C) 50
(D) 30

42. Using class marks, what is the mean mark?

(A) 30
(B) 26
(C) 25
(D) 24

43. What is the cumulative frequency up to the class 30–40?

(A) 20
(B) 30
(C) 26
(D) 6

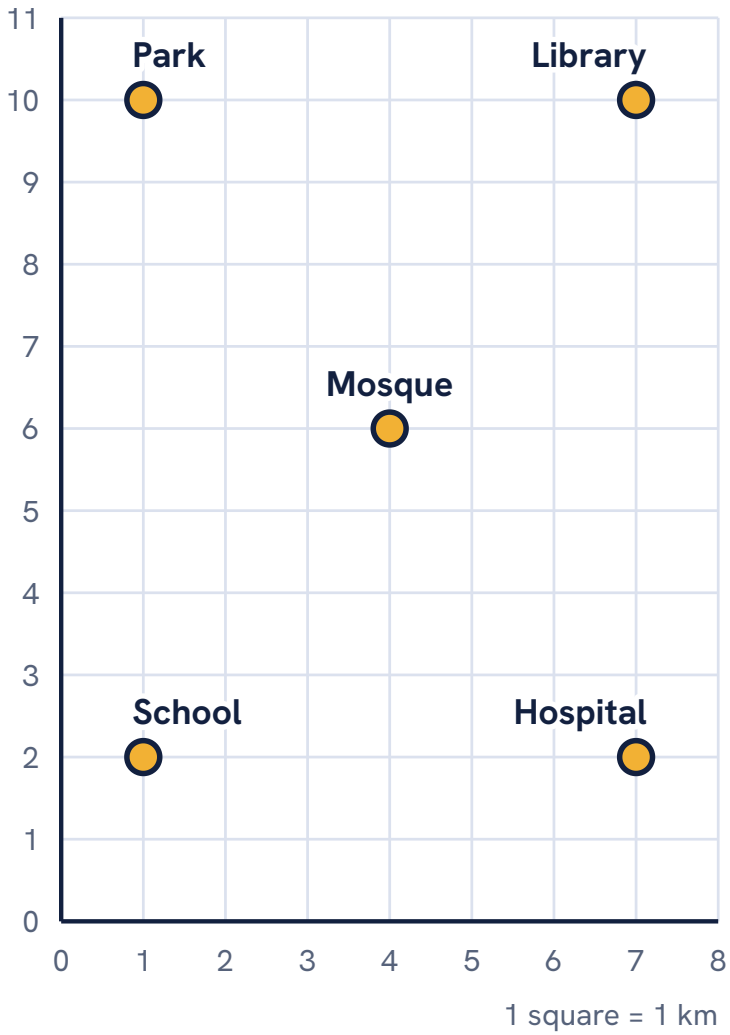
44. One student is chosen at random. What is the probability that the student scored 30 marks or more?

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

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

The map shows places in a town on a grid. Each square is 1 km.

Place	School	Hospital	Park	Mosque	Library
Coordinates	(1, 2)	(7, 2)	(1, 10)	(4, 6)	(7, 10)



45. What is the straight-line distance between the Hospital and the Park?

(A) 8 km
(B) 14 km
(C) 6 km
(D) 10 km

46. What is the midpoint of the line joining the School and the Park?

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

47. What is the slope of the straight road from the School to the Mosque?

(A) 4/3
(B) 3/4
(C) 3/2
(D) −4/3

48. Which place lies exactly halfway between the Hospital and the Park?

(A) School
(B) Library
(C) Mosque
(D) None of these places

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) Simplify $(81a^8b^{-4})^{1/4} \div (ab^{-1})^{-1}$, where $a, b > 0$.

OR

(ii) Find the equation of the line whose x-intercept is 3 and y-intercept is −4. Write it in the form $ax + by = c$.

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

(i) Solve $|4x + 3| = 11$.

OR

(ii) Describe the locus of all points that are 2 cm from a straight line AB (extend AB in both directions).

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

(i) Find the acute angle that the line $\sqrt{3}x - y + 2 = 0$ makes with the x-axis.

OR

(ii) Prove that $(\sec\theta - \tan\theta)(\sec\theta + \tan\theta) = 1$.

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

(i) A box has volume $x^3 - 2x^2 - 5x + 6$ cm^3. Given that $(x - 1)$ is a factor, factorise the volume completely and find the dimensions and volume when $x = 5$.

OR

(ii) Solve $2(x - 3) - 5 > 3x - 14$ and show the solution on a number line.

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

(i) A spinner was spun 150 times and landed on red 42 times. (a) Find the relative frequency of red. (b) Use it to estimate how many times red will appear in 400 spins.

OR

(ii) The magnitude of an earthquake is $M = \log(A/A_0)$, where A is the size of the wave and A_0 is a standard size. Earthquake X has $A = 10^{5.2}A_0$. Earthquake Y has a wave 100 times larger than X. Find the magnitudes of X and Y.

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

(i) Two similar triangles have areas 36 cm^2 and 81 cm^2. A side of the smaller triangle is 8 cm. Find the corresponding side of the larger triangle.

OR

(ii) A 10 m ladder leans against a wall and makes an angle of 60° with the ground. How high up the wall does it reach, and how far is its foot from the wall?

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

(i) For $x \in \{-2, -1, 0, 1, 2\}$, the relation R is defined by $y = x^2$. List R and state its domain and range.

OR

(ii) P is 12 km due east of Q, and R is 12 km due north of Q. Find the distance PR and the bearing of R from P.

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

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

(i) Let $A = \{2, 4, 6, 8\}$, $B = \{4, 8, 12\}$ and $C = \{8, 12, 16\}$.

(a) Verify the associative law of intersection: $A \cap (B \cap C) = (A \cap B) \cap C$. (4 marks)

(b) Find $(A \cup B) - C$. (2 marks)

OR

(ii) Two spherical balls have radii 4 cm and 10 cm.

(a) Find the ratio of their surface areas and of their volumes. (3 marks)

(b) The small ball needs 50 g of paint. How much paint does the large ball need? (1 mark)

(c) Find the volume of each ball in terms of π. (2 marks)

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

(i) For $p = x^2 - 4$ and $q = x^2 + x - 6$:

(a) Factorise p and q. (2 marks)

(b) Find their HCF and LCM. (2 marks)

(c) Verify that $p \times q = \text{HCF} \times \text{LCM}$. (2 marks)

OR

(ii) From the top of a cliff 40 m high, the angle of depression of a boat is 30°.

(a) How far is the boat from the foot of the cliff? (2 marks)

(b) The boat sails towards the cliff until the angle of depression is 60°. How far is it from the foot now? (2 marks)

(c) How far did the boat sail? (2 marks)

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

(i) Construct triangle ABC with AB = 6.5 cm, BC = 5.5 cm and CA = 4.5 cm. Draw its three medians and show that they are concurrent. Measure how the centroid divides one median.

OR

(ii) A charity shares Rs 90 000 among three villages in proportion to the number of families: 120, 150 and 180.

(a) Find the mean number of families per village. (2 marks)

(b) Find each village's share. (3 marks)

(c) How much is that per family? (1 mark)

Answer key

Mock Exam 1 · Section A marks = number correct × 0.75

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

Section A explanations

1. D. √11 · Unit 1

√11 is irrational because 11 is not a perfect square. √49 = 7, 0.25 = 1/4 and 22/7 are all ratios of integers, so they are rational.

2. B. 9 · Unit 1

$27^{2/3} = (\sqrt[3]{27})^2 = 3^2 = 9$.

3. D. 2√3 · Unit 1

Multiply top and bottom by √3: $6\sqrt{3}/3 = 2\sqrt{3}$.

4. B. 4.05×10^{-5} mm · Unit 2

Move the decimal point 5 places to the right to get 4.05, so the power is −5. 40.5×10^{-6} has the right value but is not in scientific notation, because 40.5 is not between 1 and 10.

5. C. 5 · Unit 2

$2^5 = 32$, so $\log_2 32 = 5$.

6. D. 1.0791 · Unit 2

$12 = 2^2 \times 3$, so $\log 12 = 2 \log 2 + \log 3 = 0.6020 + 0.4771 = 1.0791$.

7. C. 6 · Unit 3

$n(A \times B) = n(A) \times n(B) = 2 \times 3 = 6$.

8. C. (3, 4) · Unit 3

Equal ordered pairs have equal first and second entries: $2x - 1 = 5$ gives $x = 3$, and $y + 3 = 7$ gives $y = 4$.

9. C. {2, 3, 4} · Unit 3

The range is the set of second elements of the ordered pairs: {2, 3, 4}.

10. A. (x − 3)(x − 4) · Unit 4

Find two numbers with product +12 and sum −7: −3 and −4. So $x^2 - 7x + 12 = (x - 3)(x - 4)$.

11. C. 5 · Unit 4

By the remainder theorem, substitute $x = 2$: $8 - 8 + 5 = 5$. (Using $x = -2$ by mistake gives −11.)

12. **C. $12x^2y^3$** · Unit 4
LCM of 4 and 6 is 12; take the highest powers x^2 and y^3. So the LCM is $12x^2y^3$. (2xy is the HCF.)

13. **D. x = 11** · Unit 5
3x − 6 = 2x + 5, so x = 11. Check: 3(9) = 27 and 2(11) + 5 = 27.

14. **B. x < −3** · Unit 5
−2x > 6. Dividing by −2 reverses the sign, so x < −3.

15. **A. x = 4 or x = −3** · Unit 5
2x − 1 = 7 gives x = 4, and 2x − 1 = −7 gives x = −3. Both are 7 units from 0 after the subtraction.

16. **D. 2π/3** · Unit 6
120 × π/180 = 2π/3.

17. **A. 2π cm** · Unit 6
l = rθ = 6 × π/3 = 2π cm.

18. **B. 250°** · Unit 6
The return direction is opposite, so add 180°: 070° + 180° = 250°.

19. **C. 10** · Unit 7
$\sqrt{[(4 + 2)^2 + (-5 - 3)^2]} = \sqrt{(36 + 64)} = \sqrt{100} = 10$.

20. **B. (−2, 3)** · Unit 7
((3 − 7)/2, (−4 + 10)/2) = (−2, 3).

21. **C. 10** · Unit 7
The slope of AB is (6 − 2)/(3 − 1) = 2. For C to be on the same line, (k − 6)/(5 − 3) = 2, so k = 10.

22. **A. −2** · Unit 8
m = (−3 − 5)/(6 − 2) = −8/4 = −2.

23. **D. 3** · Unit 8
Put x = 0: −4y + 12 = 0, so y = 3.

24. **A. −1/2** · Unit 8
Perpendicular gradients multiply to −1: 2 × (−1/2) = −1.

25. **B. 120°** · Unit 9
Angle sum = (6 − 2) × 180° = 720°, and 720° ÷ 6 = 120°.

26. **B. 4 : 25** · Unit 9
The length ratio is 4 : 10 = 2 : 5, so the area ratio is $2^2 : 5^2$ = 4 : 25.

27. **A. One counterexample is enough to disprove the claim** · Unit 9
A general statement must hold in every case. 1681 = 41 × 41 is not prime, so this single counterexample shows the claim is false.

28. **A. 10 cm** · Unit 10
The centroid divides each median in the ratio 2 : 1 from the vertex, so AG = 2/3 × 15 = 10 cm.

29. **A. At the midpoint of the hypotenuse** · Unit 10
The hypotenuse is a diameter of the circumscribed circle, so the circumcentre is the midpoint of the hypotenuse.

30. **C. None** · Unit 10
The shortest distance from the end of the 6 cm side to the other arm is 6 × sin 50° ≈ 4.6 cm. The 4 cm side is shorter than this, so it cannot reach the arm and no triangle is possible.

31. **A. 12** · Unit 11
Sum = 60 and there are 5 values, so the mean = 60 ÷ 5 = 12.

32. **B. 1/3** · Unit 11
Numbers greater than 4 are 5 and 6: 2 out of 6 outcomes, so P = 2/6 = 1/3.

33. **B. {6, 12}** · Unit 3
A ∩ B contains the numbers that are multiples of both 2 and 3: 6 and 12.

34. **D. {2, 4, 8, 10}** · Unit 3
A − B is the part of A outside B: {2, 4, 8, 10}.

35. **B. {1, 5, 7, 11}** · Unit 3
The complement of A ∪ B is everything in U that is in neither set: {1, 5, 7, 11}.

36. **D. 8** · Unit 3
n(A ∪ B) = n(A) + n(B) − n(A ∩ B) = 6 + 4 − 2 = 8.

37. **C. 1.5** · Unit 9
4.5 ÷ 3 = 1.5 and 12 ÷ 8 = 1.5, so the scale factor is 1.5.

38. **D. 108π cm^2** · Unit 9
Areas scale by $k^2 = 1.5^2 = 2.25$, so 48π × 2.25 = 108π cm^2. Check: 2π × 4.5 × 12 = 108π.

39. **B. 243π cm^3** · Unit 9
Volumes scale by $k^3 = 1.5^3 = 3.375$, so 72π × 3.375 = 243π cm^3. Check: π × 4.5^2 × 12 = 243π.

40. **A. 8 : 27** · Unit 9
The length ratio is 2 : 3, so the volume ratio is $2^3 : 3^3$ = 8 : 27.

41. **D. 30** · Unit 11
Σf = 4 + 6 + 10 + 6 + 4 = 30.

42. **C. 25** · Unit 11
Class marks are 5, 15, 25, 35, 45. Σfx = 20 + 90 + 250 + 210 + 180 = 750, so the mean = 750 ÷ 30 = 25.

43. **C. 26** · Unit 11
4 + 6 + 10 + 6 = 26.

44. **A. 1/3** · Unit 11
6 + 4 = 10 students scored 30 or more, so P = 10/30 = 1/3.

45. **D. 10 km** · Unit 7
$\sqrt{[(1-7)^2 + (10-2)^2]} = \sqrt{(36+64)} = 10$ km.

46. **B. (1, 6)** · Unit 7
((1 + 1)/2, (2 + 10)/2) = (1, 6).

47. **A. 4/3** · Unit 8
m = (6 − 2)/(4 − 1) = 4/3.

48. **C. Mosque** · Unit 7
Midpoint = ((7 + 1)/2, (2 + 10)/2) = (4, 6), which is the Mosque.

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. $(81a^8b^{-4})^{1/4} = 81^{1/4}\, a^2\, b^{-1} = 3a^2b^{-1}$
2. $(ab^{-1})^{-1} = a^{-1}b$
3. $3a^2b^{-1} \div a^{-1}b = 3a^{2-(-1)}b^{-1-1} = 3a^3b^{-2}$

Answer: $3a^3/b^2$

Q1 (ii) · Unit 8 · Equation of a line

1. Intercept form: $x/3 + y/(-4) = 1$
2. Multiply by 12: $4x - 3y = 12$
3. Check: (3, 0) gives 12 ✓ and (0, −4) gives 12 ✓

Answer: $4x - 3y = 12$

Q2 (i) · Unit 5 · Absolute value equation

1. $4x + 3 = 11$ gives $4x = 8$, so $x = 2$.
2. $4x + 3 = -11$ gives $4x = -14$, so $x = -3.5$.

Answer: $x = 2$ or $x = -3.5$

Q2 (ii) · Unit 9 · Locus

1. Every point 2 cm from AB lies on a line parallel to AB at a distance of 2 cm.
2. There is one such line on each side of AB.

Answer: Two lines parallel to AB, one on each side, each 2 cm from it

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Q3 (i) · Unit 8 · Angle of a line

1. Rearrange: $y = \sqrt{3}x + 2$, so the gradient $m = \sqrt{3}$.
2. $\tan\alpha = \sqrt{3}$, so $\alpha = 60°$.

Answer: 60°

Q3 (ii) · Unit 6 · Trigonometric identity

1. LHS = $\sec^2\theta - \tan^2\theta$ (difference of squares).
2. Since $1 + \tan^2\theta = \sec^2\theta$, $\sec^2\theta - \tan^2\theta = 1$ = RHS.

Answer: LHS = 1 = RHS

Q4 (i) · Unit 4 · Factorising a cubic

1. Divide by $(x - 1)$: $x^3 - 2x^2 - 5x + 6 = (x - 1)(x^2 - x - 6)$
2. $x^2 - x - 6 = (x - 3)(x + 2)$, so $V = (x - 1)(x - 3)(x + 2)$.
3. When $x = 5$: dimensions 4 cm, 2 cm and 7 cm; volume = 56 cm^3. Check: $125 - 50 - 25 + 6 = 56$ ✓

Answer: $(x - 1)(x - 3)(x + 2)$; 4 cm, 2 cm, 7 cm; 56 cm^3

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

1. $2x - 6 - 5 > 3x - 14$, so $2x - 11 > 3x - 14$.
2. $3 > x$, which is $x < 3$.
3. Draw a hollow circle at 3 and an arrow to the left.

Answer: $x < 3$

Q5 (i) · Unit 11 · Relative frequency

1. (a) $42 \div 150 = 0.28$
2. (b) $400 \times 0.28 = 112$

Answer: (a) 0.28 (b) about 112 times

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

1. X: M = log $10^{5.2}$ = 5.2
2. Y: A = 100 × $10^{5.2}A_0$ = $10^{7.2}A_0$, so M = 7.2.

Answer: X: 5.2, Y: 7.2

Q6 (i) · Unit 9 · Similar figures

1. Area ratio = 36 : 81 = 4 : 9, so the length ratio = 2 : 3.
2. Larger side = 8 × 3/2 = 12 cm.

Answer: 12 cm

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

1. Height = 10 sin 60° = 10 × √3/2 = 5√3 ≈ 8.66 m
2. Distance of the foot = 10 cos 60° = 10 × 1/2 = 5 m

Answer: About 8.66 m up the wall; 5 m from the wall

Q7 (i) · Unit 3 · Domain and range of a relation

1. R = {(−2, 4), (−1, 1), (0, 0), (1, 1), (2, 4)}
2. Domain = {−2, −1, 0, 1, 2}
3. Range = {0, 1, 4} (each value written once)

Answer: Range {0, 1, 4}

Q7 (ii) · Unit 6 · Bearings

1. PR = √(12^2 + 12^2) = 12√2 ≈ 16.97 km
2. From P, R is 12 km west and 12 km north, so it lies exactly north-west of P.
3. North-west is the bearing 315°.

Answer: 12√2 ≈ 16.97 km on a bearing of 315°

Q8 (i) · Unit 3 · Laws of sets

1. (a) B ∩ C = {8, 12}, so A ∩ (B ∩ C) = {8}.
2. A ∩ B = {4, 8}, so (A ∩ B) ∩ C = {8}. Both sides are {8}, so the law is verified.
3. (b) A ∪ B = {2, 4, 6, 8, 12}. Removing elements of C: (A ∪ B) − C = {2, 4, 6}.

Answer: (a) both sides = {8} (b) {2, 4, 6}

Q8 (ii) · Unit 9 · Similar solids

1. (a) Length ratio 4 : 10 = 2 : 5. Surface areas 4 : 25; volumes 8 : 125.
2. (b) Paint covers surface area: 50 × 25/4 = 312.5 g.
3. (c) Small: (4/3)π × 4^3 = 256π/3 cm^3. Large: (4/3)π × 10^3 = 4000π/3 cm^3. Check: ratio 256 : 4000 = 8 : 125 ✓

Answer: (a) 4 : 25 and 8 : 125 (b) 312.5 g (c) 256π/3 and 4000π/3 cm^3

Q9 (i) · Unit 4 · HCF and LCM

1. (a) p = (x − 2)(x + 2); q = (x + 3)(x − 2).
2. (b) HCF = x − 2; LCM = (x − 2)(x + 2)(x + 3).
3. (c) p × q = (x − 2)(x + 2)(x + 3)(x − 2) and HCF × LCM = (x − 2) × (x − 2)(x + 2)(x + 3). These are the same, so it is verified.

Answer: HCF = x − 2; LCM = (x − 2)(x + 2)(x + 3)

Q9 (ii) · Unit 6 · Angles of depression

1. The angle of depression equals the angle of elevation from the boat (alternate angles).
2. (a) tan 30° = 40/d, so d = 40/tan 30° = 40√3 ≈ 69.28 m.
3. (b) d = 40/tan 60° = 40/√3 ≈ 23.09 m.
4. (c) 69.28 − 23.09 ≈ 46.19 m.

Answer: (a) ≈ 69.28 m (b) ≈ 23.09 m (c) ≈ 46.19 m

Q10 (i) · Unit 10 · Construction: medians

1. Draw AB = 6.5 cm. With centre A, radius 4.5 cm, and centre B, radius 5.5 cm, draw arcs meeting at C. Join AC and BC.
2. Construct the perpendicular bisector of each side to find the midpoints D (of BC), E (of CA) and F (of AB).
3. Join AD, BE and CF. They meet at one point G, so the medians are concurrent.
4. Measuring, AG is twice GD: the centroid divides each median in the ratio 2 : 1.

Answer: The medians meet at the centroid G, with AG : GD = 2 : 1

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

1. (a) Total 450 families; mean = 450 ÷ 3 = 150.
2. (b) 120/450 × 90 000 = Rs 24 000; 150/450 × 90 000 = Rs 30 000; 180/450 × 90 000 = Rs 36 000.
3. (c) 90 000 ÷ 450 = Rs 200 per family.

Answer: (a) 150 (b) Rs 24 000, Rs 30 000, Rs 36 000 (c) Rs 200

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