ExamPath

CLASS 9 MATHEMATICS · FBISE · UNIT 8

Unit 8: Geometry of Straight Lines — Advanced Practice

20 multiple-choice questions Suggested time: **20 minutes** 1 mark each

Name: Date: Score: / 20

Circle one answer for each question. The answer key with explanations is on the last pages, so try every question before you check. These are practice questions, not official FBISE papers.

1. Find the angle from the line of slope 1/2 to the line of slope 3.

(A) 60°
(B) 45°
(C) 30°
(D) 90°

2. The two-point form of the equation of a line through (x_1, y_1) and (x_2, y_2) is:

(A) $(y + y_1)/(y_2 + y_1) = (x + x_1)/(x_2 + x_1)$
(B) $(y - y_1)/(x_2 - x_1) = (x - x_1)/(y_2 - y_1)$
(C) $(y - y_1)/(y_2 - y_1) = (x - x_1)/(x_2 - x_1)$
(D) $(y - y_1)/(y_2 - y_1) = (x_2 - x_1)/(x - x_1)$

3. The angle θ from a line of slope m_1 to a line of slope m_2 is given by:

(A) $\tan\theta = m_1m_2/(m_2 - m_1)$
(B) $\tan\theta = (m_2 - m_1)/(1 + m_1m_2)$
(C) $\tan\theta = (m_2 - m_1)/(1 - m_1m_2)$
(D) $\tan\theta = (m_2 + m_1)/(1 - m_1m_2)$

4. Find the equation of the line with x-intercept 3 and y-intercept 5.

(A) $5x + 3y - 15 = 0$
(B) $5x + 3y + 15 = 0$
(C) $5x - 3y - 15 = 0$
(D) $3x + 5y - 15 = 0$

5. A line has slope 2. A student says a line perpendicular to it has slope −2. What is wrong?

(A) Nothing, −2 is correct
(B) The slope must be 1/2
(C) The slope must be the negative reciprocal, −1/2, because the product must be −1
(D) The slope must be 0

6. A taxi charges C = 25d + 100 rupees for d kilometres. What do 25 and 100 represent?

(A) 25 is the total fare for 100 km
(B) 25 is the rate per kilometre (slope), and 100 is the fixed charge (y-intercept)
(C) Both are rates per kilometre
(D) 25 is the fixed charge, and 100 is the rate per kilometre

7. Why does the angle formula give 90° for perpendicular lines?

(A) Because the slopes are equal
(B) Because both slopes are positive
(C) Because the numerator is zero
(D) Since $m_1m_2 = -1$, the denominator $1 + m_1m_2$ is zero, and tan 90° is undefined

8. The normal form of the equation of a line is:

(A) $x \cos \alpha + y \sin \alpha = p$
(B) $x/\cos \alpha + y/\sin \alpha = 1$
(C) $y = x \tan \alpha + p$
(D) $x \sin \alpha + y \cos \alpha = p$

9. Why is the angle between two parallel lines 0°?

(A) Because their slopes multiply to −1
(B) Because parallel lines never meet
(C) Because $m_1 = m_2$ makes the numerator of tan θ zero, so tan θ = 0
(D) Because the denominator becomes zero

10. Why does equal slope of AB and BC prove that A, B and C are collinear?

(A) Equal slopes mean the lines are perpendicular
(B) AB and BC share the point B, so equal slopes mean they lie on the same line
(C) Equal slopes mean the points form a triangle
(D) Equal slopes mean AB = BC

11. Why can the point-slope form not be used for a vertical line?

(A) A vertical line has no defined slope
(B) A vertical line has slope 0
(C) The formula only works for lines through the origin
(D) A vertical line has no point

12. The point-slope form of the equation of a line through (x_1, y_1) with slope m is:

(A) $y + y_1 = m(x + x_1)$
(B) $x - x_1 = m(y - y_1)$
(C) $y = m(x - x_1) - y_1$
(D) $y - y_1 = m(x - x_1)$

13. The two-intercept form of a line with x-intercept a and y-intercept b is:

(A) $x/b + y/a = 1$
(B) $ax + by = 0$
(C) $x/a - y/b = 1$
(D) $x/a + y/b = 1$

14. The gradient of a hill is 1/25. What does this mean?

(A) The hill is inclined at 25°
(B) The hill is 25 m high
(C) For every 1 m travelled horizontally, the road rises 25 m
(D) For every 25 m travelled horizontally, the road rises 1 m

15. Which pair of slopes belongs to two perpendicular lines?

(A) 2/3 and 3/2
(B) 2/3 and −2/3
(C) 2/3 and 2/3
(D) 2/3 and −3/2

16. The slope of the line $ax + by + c = 0$ (with $b \neq 0$) is:

(A) $-a/b$
(B) $-c/b$
(C) $-b/a$
(D) a/b

17. A student says the slope of $2x + 3y - 6 = 0$ is 2/3. What is the mistake?

(A) The slope is the constant term, −6
(B) The slope should be 3/2
(C) The slope is $-a/b = -2/3$, so the negative sign was missed
(D) There is no mistake

18. Find the equation of the line through (2, −3) perpendicular to a line of slope 2/3.

(A) $3x + 2y = 0$
(B) $3x - 2y = 12$
(C) $2x + 3y = 0$
(D) $2x - 3y = 13$

19. Why does every line of the form $(a_1x + b_1y + c_1) + k(a_2x + b_2y + c_2) = 0$ pass through the intersection point of the two given lines?

(A) Because k is always 1
(B) Because the two lines are parallel
(C) At that point both brackets are zero, so the equation holds for every k
(D) Because the lines are perpendicular

20. Find the point of intersection of $x + y = 7$ and $x - y = 1$.

(A) (8, 6)
(B) (4, 3)
(C) (3, 4)
(D) (1, 7)

Answer key

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1 B	**2** C	**3** B	**4** A	**5** C
6 B	**7** D	**8** A	**9** C	**10** B
11 A	**12** D	**13** D	**14** D	**15** D
16 A	**17** C	**18** A	**19** C	**20** B

Explanations

1. B. 45°
tan θ = (3 − 1/2)/(1 + 3/2) = (5/2)/(5/2) = 1, so θ = 45°.

2. C. $(y - y_1)/(y_2 - y_1) = (x - x_1)/(x_2 - x_1)$
The slope between (x, y) and (x_1, y_1) equals the slope between (x_2, y_2) and (x_1, y_1).

3. B. $\tan\theta = (m_2 - m_1)/(1 + m_1m_2)$
This comes from $\tan(\alpha - \beta) = (\tan\alpha - \tan\beta)/(1 + \tan\alpha\tan\beta)$.

4. A. 5x + 3y − 15 = 0
x/3 + y/5 = 1. Multiplying by 15 gives 5x + 3y = 15.

5. C. The slope must be the negative reciprocal, −1/2, because the product must be −1
2 × (−2) = −4, not −1. The perpendicular slope is −1/2.

6. B. 25 is the rate per kilometre (slope), and 100 is the fixed charge (y-intercept)
The y-intercept is the cost at d = 0, which is the fixed charge. The slope is the extra cost per km.

7. D. Since $m_1m_2 = -1$, the denominator $1 + m_1m_2$ is zero, and tan 90° is undefined
A zero denominator means tan θ is undefined, which happens at θ = 90°.

8. A. $x\cos\alpha + y\sin\alpha = p$
Here p is the perpendicular distance from the origin to the line and α is the inclination of that perpendicular.

9. C. Because $m_1 = m_2$ makes the numerator of tan θ zero, so tan θ = 0
$\tan\theta = (m_2 - m_1)/(1 + m_1m_2) = 0$ when $m_1 = m_2$, so θ = 0°.

10. B. AB and BC share the point B, so equal slopes mean they lie on the same line
Two lines through the same point with equal slopes must be the same line.

11. A. A vertical line has no defined slope
Point-slope form needs the slope m, but a vertical line (x = a) has undefined slope.

12. D. $y - y_1 = m(x - x_1)$
Slope = $(y - y_1)/(x - x_1) = m$, which rearranges to $y - y_1 = m(x - x_1)$.

13. D. x/a + y/b = 1
The line passes through (a, 0) and (0, b), which gives x/a + y/b = 1.

14. D. For every 25 m travelled horizontally, the road rises 1 m
Gradient = vertical rise ÷ horizontal run = 1/25.

15. D. 2/3 and −3/2
Only (2/3) × (−3/2) = −1.

16. **A. −a/b**

Solving for y gives y = (−a/b)x − c/b, so the slope is −a/b.

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17. **C. The slope is −a/b = −2/3, so the negative sign was missed**

Writing y = −(2/3)x + 2 shows that the slope is −2/3.

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18. **A. 3x + 2y = 0**

The slope is −3/2. y + 3 = −(3/2)(x − 2) gives 2y + 6 = −3x + 6, so 3x + 2y = 0.

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19. **C. At that point both brackets are zero, so the equation holds for every k**

The intersection point satisfies both original equations, so both brackets equal 0 for any value of k.

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20. **B. (4, 3)**

Adding gives 2x = 8, so x = 4. Then y = 3.

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