CHAPTER 12.3

# Hyperbolas

Multiple-Choice Old Exam Questions

8 questions • 2 topics • options A–E • two questions per page

## Topic 1 | Asymptotes, Eccentricity and Foci

*Finding asymptotes, foci and the eccentricity of a hyperbola, and the difference of focal distances • Questions 1–6*

Q **1**

The equation of one of the asymptotes of the hyperbola with vertices at $(\pm 2,\ 0)$ and eccentricity $e = 2$ is

**A)** $y = -\sqrt{3}x$

**B)** $y = \frac{\sqrt{3}}{3}x$

**C)** $y = -\frac{\sqrt{3}}{2}x$

**D)** $y = \frac{2\sqrt{3}}{3}x$

**E)** $y = -\frac{1}{2}x$

Q **2**

The equation of one of the asymptotes of the hyperbola $9x^2 - 4y^2 - 18x + 24y - 63 = 0$ is

**A)** $3x + 2y - 9 = 0$

**B)** $3x - 2y - 3 = 0$

**C)** $3x + 2y - 3 = 0$

**D)** $2x - 3y + 7 = 0$

**E)** $2x + 3y - 7 = 0$

Q
**3**

The asymptote with positive slope of the hyperbola $x^2 - 25y^2 - 2x - 100y - 124 = 0$ is

**A)** $5y - x + 11 = 0$

**B)** $5x - y - 7 = 0$

**C)** $5y - x - 7 = 0$

**D)** $5x - y + 7 = 0$

**E)** $5x - y + 6 = 0$

Q
**4**

The eccentricity of the hyperbola given by $9y^2 - 36x^2 - 4 = 0$ is

**A)** $\frac{\sqrt{5}}{2}$

**B)** $\frac{\sqrt{3}}{2}$

**C)** $\frac{\sqrt{17}}{4}$

**D)** $\frac{1}{2}$

**E)** $\frac{3}{2}$

Q
**5**

One of the foci of the hyperbola with vertices at $(9, -2)$ and $(-7, -2)$ and eccentricity $e = \frac{5}{4}$ is

**A)** $(-9, -2)$

**B)** $(-4, -2)$

**C)** $(-11, -2)$

**D)** $(6, -2)$

**E)** $(12, -2)$

Q
**6**

Let $P$ be any point on the hyperbola $81x^2 + 162x - 4y^2 + 16y + 29 = 0$ with foci $F_1$ and $F_2$. If $PF_1$ and $PF_2$ are the distances from $P$ to $F_1$ and from $P$ to $F_2$ respectively, then $|PF_2 - PF_1| =$

**A)** $8$

**B)** $3$

**C)** $\frac{2}{3}$

**D)** $\frac{4}{3}$

**E)** $6$

## Topic 2 | Equation of a Hyperbola

*Writing the equation of a hyperbola from its center, focus, vertex, point or asymptote • Questions 7–8*

Q **7**

A hyperbola with center $(2,\ 7)$ passes through the point $(4,\ 5)$ and has one asymptote with slope $2$. Its transverse axis is horizontal. Its equation is

**A)** $4x^2 - 16x - y^2 + 14y - 45 = 0$

**B)** $4x^2 + 16x - y^2 + 14y + 81 = 0$

**C)** $4x^2 - 8x - y^2 + 14y - 54 = 0$

**D)** $4x^2 - 4x - y^2 + 6y - 144 = 0$

**E)** $4y^2 + 8y - x^2 + 14x - 54 = 0$

Q **8**

The equation of the hyperbola with center $(1,\ -2)$, one focus at $(-2,\ -2)$ and one vertex at $(-1,\ -2)$ is

**A)** $5(x-1)^2 - 4(y+2)^2 = 20$

**B)** $4(y+2)^2 - 5(x-1)^2 = 20$

**C)** $4(y-2)^2 - 5(x+1)^2 = 20$

**D)** $4(x-1)^2 - 5(y+2)^2 = 20$

**E)** $5(x+1)^2 - 4(y-2)^2 = 20$

# Answer Key

*"Original" shows the question number in the source worksheet.*

| Q | Original | Ans. | Value |
|---|---|---|---|
| **1** | 1 | **A** | $y = -\sqrt{3}x$ |
| **2** | 2 | **A** | $3x + 2y - 9 = 0$ |
| **3** | 6 | **A** | $5y - x + 11 = 0$ |
| **4** | 7 | **A** | $\frac{\sqrt{5}}{2}$ |
| **5** | 3 | **A** | $(-9, -2)$ |
| **6** | 4 | **D** | $\frac{4}{3}$ |
| **7** | 5 | **A** | $4x^2 - 16x - y^2 + 14y - 45 = 0$ |
| **8** | 8 | **A** | $5(x-1)^2 - 4(y+2)^2 = 20$ |