

PCH Ch 9 - 10 Exam (No Calculators Permitted)

Matching

Match the equation with the name of the polar graph

a. $r = 2 + 2\cos \theta$

b. $r = 2\cos 3\theta$

c. $r = 3 + 2\cos \theta$

d. $r = 2\cos \theta$

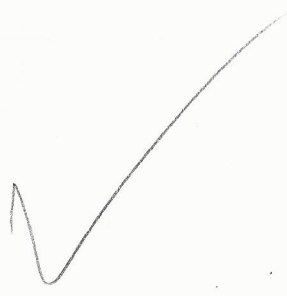
e. $r = \theta$

f. $r = \frac{\pi}{2}$

g. $r = 2 + 4\cos \theta$

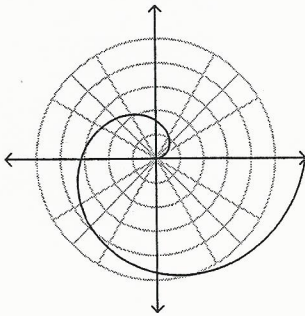
h. $r = 4 + 2\cos \theta$

- 1. spiral *ve*
- 2. cardioid *av*
- 3. convex limaçon *hv*
- 4. circle *dv*
- 5. dimpled or dented limaçon *cv*
- 6. limaçon with a loop *gv*

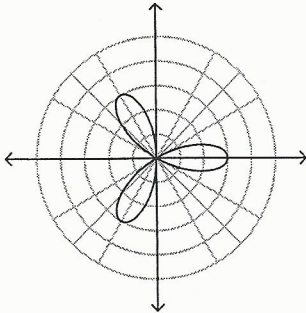


Match the graph with the equation

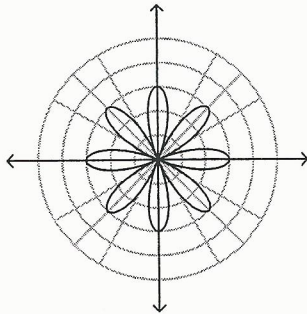
a.



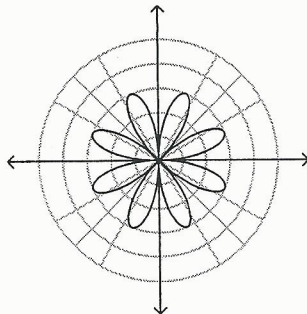
b.



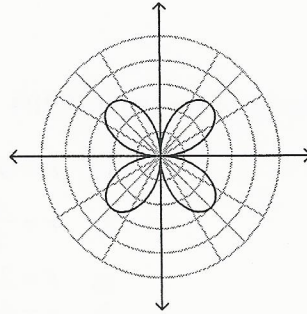
c.



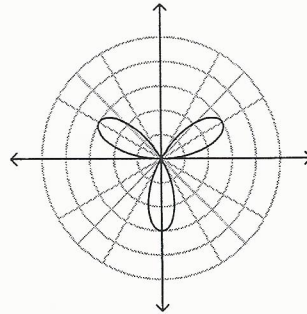
d.



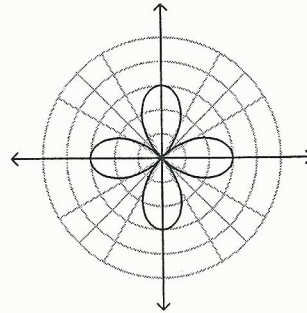
e.



f.



g.



h.

none of these

- 7. $3 \cos 4\theta$ *cv*
- 8. $3 \sin 2\theta$ *ev*
- 9. $3 \sin 3\theta$ *fv*
- 10. $3 \sin 4\theta$ *dv*
- 11. $3 \cos 3\theta$ *bv*

Name: _____

12. $r = \theta$ *av*

Degenerate Conics - Match the equations with the description of the graph.

- | | |
|------------------|---------------------------|
| a. an ellipse | e. two intersecting lines |
| b. a hyperbola | f. a parabola |
| c. the empty set | g. a point |
| d. a circle | h. none of these |

13. $\frac{x^2}{6} + \frac{y^2}{6} = 0$ *g*

14. $\frac{x^2}{6} + \frac{y^2}{6} = 1$ *b*

15. $\frac{x^2}{4} + \frac{y^2}{6} = -1$ *c*

16. $\frac{x^2}{4} + \frac{y^2}{6} = 0$ *g*

17. $\frac{x^2}{4} - \frac{y^2}{6} = -1$ *b*

18. $\frac{x^2}{4} - \frac{y^2}{6} = 0$ *e*

Determine the type of sequence

- | | |
|---------------|------------|
| a. arithmetic | c. neither |
| b. geometric | |

19. $\ln 1, \ln 2, \ln 4, \dots$ *c*

20. $2, 4, 6, 8, \dots$ *a* *tz*

21. e^4, e^5, e^6, \dots *b* *xe*

22. $1, \frac{1}{7}, \frac{1}{14}, \frac{1}{21}, \dots$ ~~*a*~~ ~~*b*~~ ~~*c*~~ ~~*d*~~ ~~*e*~~ ~~*f*~~ ~~*g*~~ ~~*h*~~ *b* *v*

23. $1, 2, 4, 8, \dots$ *b*

Match the formula

a. $\frac{n}{2}(a_1 + a_n)$

b. $a_n = a_1 + nd$

c. $a_n = a_1 + (n-1)d$

d. $\frac{a_1}{1-r}$

e. $a_n = a_1 r^n$

f. $a_n = a_1 r^{n-1}$

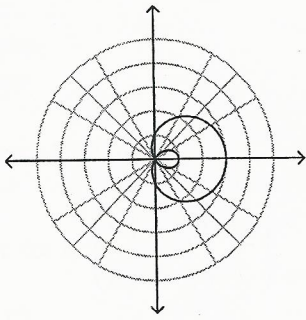
g. $\frac{a_1}{1+r}$

h. $a_1 \left(\frac{1-r^n}{1-r} \right)$

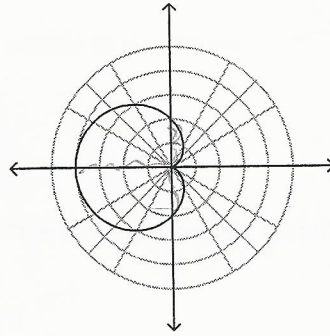
24. The sum of the first n terms of finite geometric sequence ~~g~~ h
25. The nth term of an arithmetic sequence c
26. The sum of the first n terms of an arithmetic sequence a
27. The nth term of a geometric sequence. f
28. The sum of an infinite geometric sequence d

Match the graph with the equation

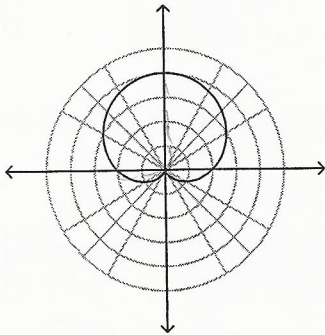
a.



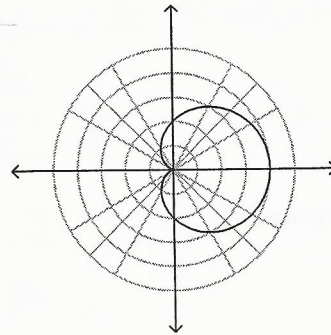
e.



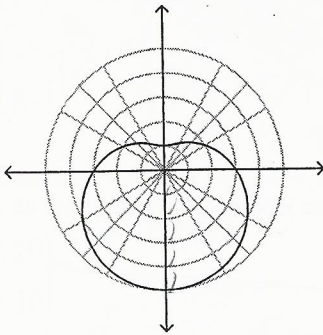
b.



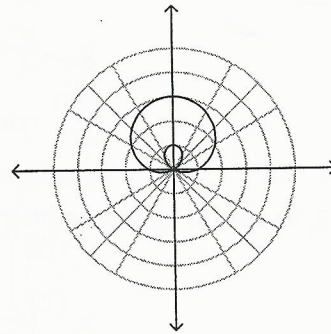
f.



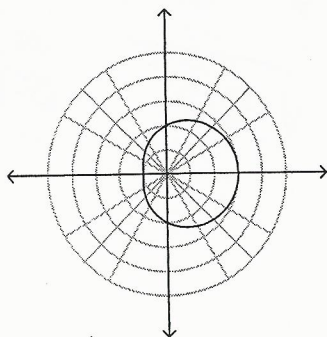
c.



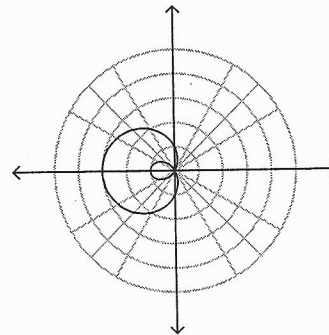
g.



d.



h.



29. $1 - 2\cos \theta$ *h*

30. $1 + 2\sin \theta$ *g*

31. $2 - 2\cos \theta$ *e*

32. $2 - \cos \theta$ *ab*
 33. $1 + 2 \cos \theta$ *a*
 34. $2 + 2 \sin \theta$ *b*

Multiple Choice

Identify the choice that best completes the statement or answers the question.

Vectors

35. If $\vec{A} = \langle -2, 6 \rangle$ and $\vec{B} = \langle 4, -1 \rangle$, find $2\vec{A} - 3\vec{B} =$
- Handwritten work:*
 $2\langle -2, 6 \rangle - 3\langle 4, -1 \rangle = \langle -4, 12 \rangle - \langle 12, -3 \rangle = \langle -16, 15 \rangle$
- a. $\langle 16, 9 \rangle$
 b. $\langle 15, -16 \rangle$
 c. $\langle -8, 9 \rangle$
 d. $\langle 10, 25 \rangle$
 e. $\langle -16, 15 \rangle$ *(circled)*
 f. none of these

36. Find the angle between the vectors $\langle 2, 1 \rangle$ and $\langle -1, -3 \rangle$

- a. $\frac{5\pi}{4}$
 b. $\frac{3\pi}{4}$
 c. $\frac{\pi}{4}$
 d. $\frac{3\pi}{4}$
- Handwritten work:*
 $\cos \theta = \frac{-2-3}{\sqrt{5} \cdot \sqrt{10}} = \frac{-5}{\sqrt{50}} = \frac{-5}{5\sqrt{2}} = -\frac{1}{\sqrt{2}}$
 $\theta = \frac{3\pi}{4}$
- e. $\frac{\pi}{2}$
 f. $\frac{\pi}{2}$
 g. $\frac{\pi}{4}$
 h. none of these

37. Let P and Q be the points $(-2, 4)$ and $(5, 3)$, respectively. Find the unit vector in the same direction as \vec{PQ}

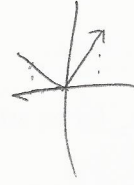
- a. $\left\langle \frac{-2}{2\sqrt{5}}, \frac{4}{2\sqrt{5}} \right\rangle$
 b. $\left\langle \frac{7}{5\sqrt{2}}, \frac{1}{5\sqrt{2}} \right\rangle$ *(circled)*
 c. $\left\langle \frac{-2}{5\sqrt{2}}, \frac{4}{5\sqrt{2}} \right\rangle$
 d. $\left\langle \frac{7}{5\sqrt{2}}, \frac{1}{5\sqrt{2}} \right\rangle$
- e. $\left\langle \frac{5}{\sqrt{34}}, \frac{3}{\sqrt{34}} \right\rangle$
 f. $\left\langle \frac{-7}{5\sqrt{2}}, \frac{1}{5\sqrt{2}} \right\rangle$
 g. none of these
- Handwritten work:*
 $\vec{PQ} = \langle 7, -1 \rangle$
 $|\vec{PQ}| = \sqrt{7^2 + (-1)^2} = \sqrt{50} = 5\sqrt{2}$
 Unit vector = $\left\langle \frac{7}{5\sqrt{2}}, \frac{-1}{5\sqrt{2}} \right\rangle$

38. Find $\langle 4, -1 \rangle \cdot \langle -4, -3 \rangle$
- Handwritten work:*
 $4(-4) + (-1)(-3) = -16 + 3 = -13$
- a. -16
 b. 48
 c. -19
 d. 13
 e. -13 *(circled)*
 f. 19
 g. 16
 h. none of these

39. Determine if $\vec{u} = \langle 2, 3 \rangle$ and $\vec{v} = \langle -3, 2 \rangle$ are orthogonal vectors.

- a. yes
- b. no

c. unable to determine



$\cos(\theta) = 0$

Binomial Theorem

40. Solve for n: $\binom{n}{6} = 2 \binom{n-1}{5}$

- a. 12
- b. 10
- c. 11

what.

$$\frac{n!}{6!(n-6)!} = 2 \left(\frac{n-1!}{5!(n-6)!} \right)$$

- d. 6
- e. 14
- f. none of these

$$\frac{\cancel{(n-6)!} n! \cancel{5!}}{6!(n-1!)(n-6)!} = 2$$

41. What is the 9th term in the expansion of $\left(x^2 - \frac{4}{y^4}\right)^{18}$

a. $\binom{18}{9} (x^2)^{10} \left(\frac{-4}{y^4}\right)^8$

d. $\binom{18}{8} (x^2)^9 \left(\frac{-4}{y^4}\right)^9$

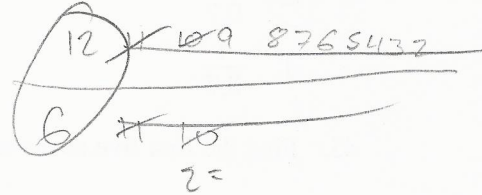
b. $\binom{18}{9} (x^2)^9 \left(\frac{-4}{y^4}\right)^9$

e. none of these

c. $\binom{18}{8} (x^2)^{10} \left(\frac{-4}{y^4}\right)^8$

$\binom{18}{0} = \text{term 1}$
 $\binom{18}{1} = \text{term 2}$

$$\frac{n!}{6(n-1!)} = 2$$



42. The binomial coefficient of the 15th term of the expansion of $(a+b)^{20}$ is.

a. $\binom{20}{10}$

d. $\binom{20}{15}$

b. $\binom{20}{16}$

e. none of these

c. $\binom{20}{14}$

Sequences

43. Find the formula for a_n for an arithmetic sequence if $a_5 = 14$ and $a_{12} = 16.8$

a. ~~$a_n = \frac{3}{5}n + 12$~~

d. ~~$a_n = \frac{2}{5}n + 12.8$~~

b. $a_n = \frac{2}{5}n + 12$ *not*

e. ~~$a_n = \frac{3}{5}n + 12.6$~~

c. ~~$a_n = \frac{2}{5}n + 11.8$~~

f. none of these

plug n' chug yay!

44. Evaluate the sum $\sum_{i=1}^{\infty} 4(.3)^i$

1.2 / 0.7

a. $\frac{3}{7}$

e. does not exist

b. 4.33333...

f. $\frac{3}{4}$

c. $\frac{1.2}{0.7}$

g. none of these

d. $\frac{4}{0.7}$

45. Find the first five terms of the sequence $a_1 = 2, a_2 = 1, a_n = 3a_{n-1} - 2a_{n-2}$

a. none of these

d. $2, 1, -1, -5, -13$

b. ~~$2, 1, -1, -6, -13$~~

e. ~~$2, 1, -5, -13, -29$~~

c. ~~$2, 1, -1, -3, -5$~~

f. ~~$2, 1, 1, 5, 13$~~

*$a_3 = 3 - 4 = -1$
 $a_4 = -3 - 2 = -5$
 $a_5 = -15 + 2 = -13$*

46. Evaluate the sum: $\sum_{i=0}^{11} (3i - 1)$

$\frac{12}{2}(-1 + 32)$

a. 180

d. 272

b. 186

e. 170

c. 190

$6(31)$

f. none of these

47. Evaluate the sum $\sum_{i=1}^{\infty} \frac{2}{3}(2)^i$

186

a. $-\frac{2}{3}$

e. $\frac{2}{3}$

b. 2

f. $\frac{3}{2}$

c. does not exist

g. none of these

d. $-\frac{3}{2}$

48. Given a geometric sequence with $S_4 = 45$ and $r = 2$, find a_1 .

a. 3

b. $\frac{45}{8}$

c. $\frac{45}{31}$

d. $\frac{45}{7}$

e. none of these

$S_3 = \frac{45}{2}$

$S_2 = \frac{45}{4}$

$S = \frac{45}{6}$

49. Find the sum of the first 18 even integers.

a. 306

b. 380

c. 304

d. 153

e. 151

f. 342

g. 340

h. none of these

$9(0 + 36)$

306

~~0 2 4 6 8 10 12 14~~

Conic Sections

0 is an even integer

50. Find the equation of the hyperbola with vertices $(-2, 7)$ and $(-2, 3)$ if the foci are $2\sqrt{17}$ units apart.

a. $\frac{(y-5)^2}{4} - \frac{(x+2)^2}{4} = 1$

e. $\frac{(y+5)^2}{4} - (x-2)^2 = 1$

b. $\frac{(y-5)^2}{4} - (x+2)^2 = 1$

f. $\frac{(x+5)^2}{4} - (y-2)^2 = 1$

c. $\frac{(x+2)^2}{4} - (y-5)^2 = 1$

g. $\frac{(y-5)^2}{4} - (x-2)^2 = 1$

d. $\frac{(x-5)^2}{4} - (y+2)^2 = 1$

h. none of these

51. Find the equation of the parabola with directrix $x = -1$ and focus $(-5, 4)$.

a. $(y-4)^2 = 8(x+3)$

e. $(y+4)^2 = -8(x-3)$

b. $(x+3)^2 = -8(y-4)$

f. $(y-4)^2 = -8(x+3)$

c. $(x+3)^2 = 8(y-4)$

g. none of these

d. $(y+4)^2 = 8(x-3)$

$(-3, 4)$

52. Find the equation of the ellipse if its vertices are at $(-2, 10)$ and $(-2, -2)$ and the foci are at $(-2, 4 \pm 2\sqrt{5})$.

a. ~~$\frac{(y-4)^2}{36} + \frac{(x+2)^2}{20} = 1$~~

b. $\frac{(y-4)^2}{36} + \frac{(x+2)^2}{16} = 1$

c. ~~$\frac{(y+4)^2}{16} + \frac{(x-2)^2}{36} = 1$~~

d. ~~$\frac{(y+4)^2}{36} + \frac{(x-2)^2}{20} = 1$~~

e. ~~$\frac{(y-4)^2}{16} + \frac{(x+2)^2}{36} = 1$~~ $c: (-2, 4)$

f. ~~$\frac{(y+4)^2}{36} + \frac{(x-2)^2}{16} = 1$~~

g. none of these

Hyperbolas

Given the hyperbola: $x^2 - 9y^2 - 10x - 18y + 15 = 0$ $(x^2 - 10x + 25) - 9(y^2 + 2y + 1) = -15$

53. Find the equation of the asymptotes of the hyperbola.

a. $y + 1 = \pm \frac{1}{3}(x + 5)$

b. $y + 1 = \pm \frac{1}{3}(x - 5)$

c. $y + 1 = \pm 3(x - 5)$

d. $y - 1 = \pm \frac{1}{3}(x + 5)$

e. ~~$y - 1 = \pm 3(x + 5)$~~

f. $y + 1 = \pm \frac{1}{9}(x - 5)$

g. ~~$y - 1 = \pm \frac{1}{9}(x + 5)$~~

h. none of these

54. Find the center of the hyperbola

a. $(-5, -1)$

b. $(5, 1)$

c. $(1, 5)$

d. $(5, -1)$

e. $(-1, 5)$

f. $(-5, 1)$

g. $(-1, -5)$

h. none of these

55. Find the eccentricity of the hyperbola.

a. $\frac{\sqrt{10}}{2}$

b. $\frac{\sqrt{10}}{3}$

c. $\frac{3\sqrt{10}}{10}$

d. $\frac{\sqrt{10}}{5}$

e. None of these

Parabolas

Given $x^2 - 4x - 8y = 20$

$$(x^2 - 4x + 4) = 8y + 24$$

$$(x-2)^2 = 8(y+3)$$

56. Find the focus of the parabola

- | | |
|-------------|------------------|
| a. (0, -1) | e. (-2, 1) |
| b. (2, -1) | f. (0, -3) |
| c. (2, -3) | g. (-2, -3) |
| d. (-2, -3) | h. none of these |

57. Find the directrix of the parabola.

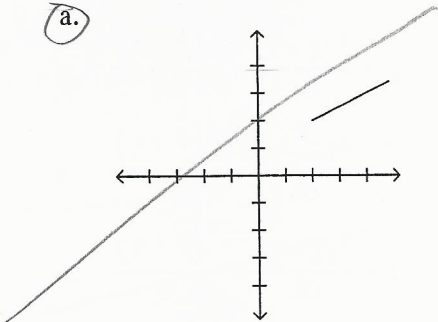
- | | |
|-------------|------------------|
| a. $y = -3$ | e. $y = -2$ |
| b. $y = 0$ | f. $y = -5$ |
| c. $x = 4$ | g. $y = -1$ |
| d. $x = 0$ | h. none of these |

Parametric Equations

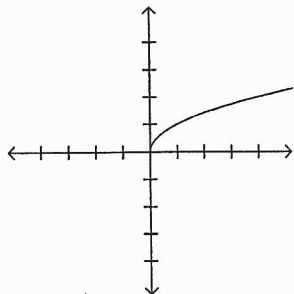
58. Identify the graph whose parametric equations are given:

$x(t) = 2e^t$, and $y(t) = 1 + e^t, t \geq 0$

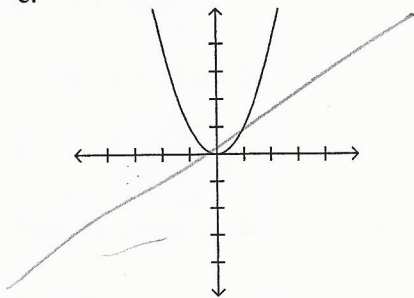
a.



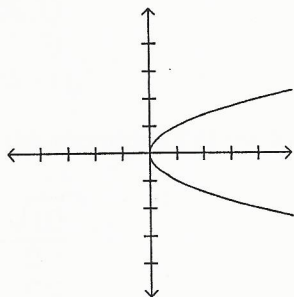
b.



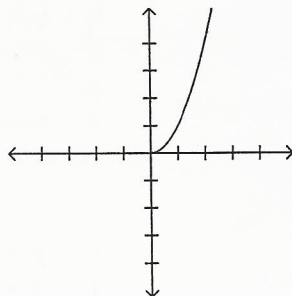
c.



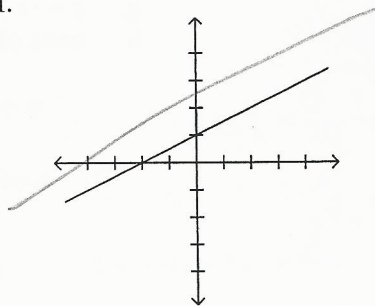
d.



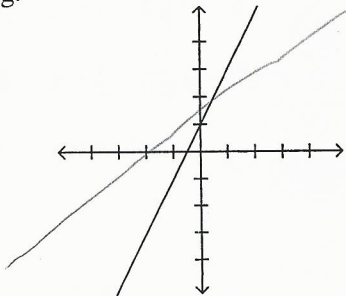
e.



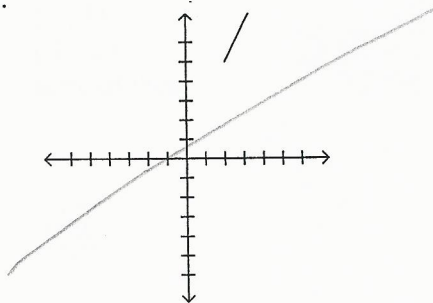
f.



g.



h.



59. The rectangular equation for the parametric equations given by $x(t) = 2 \cos t$, $y(t) = 3 \sin t$ $0 \leq t \leq 2\pi$ is which of the following:

a. $\frac{x^2}{9} - \frac{y^2}{4} = 1$

d. $\frac{x^2}{9} + \frac{y^2}{4} = 1$

b. $\frac{x^2}{4} - \frac{y^2}{9} = 1$

e. none of these

c. $x^2 + y^2 = 36$

f. $\frac{x^2}{4} + \frac{y^2}{9} = 1$

 $4\cos^2(t)$

60. Find the rectangular equation for the parametric equations given by

$x(t) = 3t^2$, $y(t) = 4t$

a. $x = \frac{16y^2}{3}$

d. $x = \frac{3y^2}{16}$

b. $y = \frac{3x^2}{16}$

e. none of these

c. $y = \frac{16x^2}{3}$

 $\frac{4}{3}$

Student Grade Report

Legend: Incorrect:

Student: Vestil, Keanu

	Grade	Total Score	Score (%)
Overall	B	50.00 / 60.00	83.33 <div style="display: inline-block; width: 50px; height: 10px; background-color: #ccc; border: 1px solid #000;"></div>

Responses

Question	Response	Correct Answer	Question	Response	Correct Answer	Question	Response	Correct Answer
Question1	E		Question21	B		Question41	C	
Question2	A		Question22	B	C	Question42	C	
Question3	H		Question23	B		Question43	B	
Question4	D		Question24	H		Question44	C	
Question5	C		Question25	C		Question45	D	
Question6	G		Question26	A		Question46	C	B
Question7	C		Question27	F		Question47	B	C
Question8	E		Question28	D		Question48	B	A
Question9	F		Question29	H		Question49	A	F
Question10	D		Question30	G		Question50	D	B
Question11	B		Question31	E		Question51	F	
Question12	A		Question32	(A,B)		Question52	B	
Question13	G		Question33	A		Question53	F	B
Question14	D		Question34	B		Question54	D	
Question15	C		Question35	E		Question55	C	B
Question16	G		Question36	H	B	Question56	B	
Question17	B		Question37	B		Question57	F	
Question18	E		Question38	E		Question58	A	
Question19	C		Question39	A		Question59	F	
Question20	A		Question40	A		Question60	E	D