BOOST UP PDFS | Quantitative Aptitude | Quadratic Equation (Moderate Level Part-1)

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We Exam Pundit Team, has made this "BOOST UP PDFS" Series to provide The Best Free PDF Study Materials on All Topics of Reasoning, Quantitative Aptitude & English Section. This Boost Up PDFs brings you questions in different level, Easy, Moderate & Hard, and also in New Pattern Questions. Each PDFs contains 50 Questions along with Explanation. For More PDF Visit: pdf.exampundit.in

Direction (1-5): Two equations (I) and (II) are given in each question. On the basis of these equations. You have to decide the relation between 'x' and 'y' and give answer.

a. x > y

b. x < y

c. x ≤ y

d. x ≥ y

e. x = y or no relation can be decided between 'x' and 'y'.

1.	I. $x^2-6x+135=0$	II. $y^2-30y+225=0$
2.	I. $6x^2+77x+121=0$	II. $y^2+9y-22=0$
3.	I. $(x-8)(2y+9)=25$	II. $(2x-16)(y-4)=8$
4.	I. $x^2-15x-364=0$	II. $y^2+31y+240=0$
5.	I. $x^2-43x+462=0$	II. $y^2-37y+342=0$

Direction (6-10): Two equations (I) and (II) are given in each question. On the basis of these equations. You have to decide the relation between 'x' and 'y' and give answer.

a. x > y

b. x < y

c. x ≤ y

d. x ≥ y

e. x = y or no relation can be decided between 'x' and 'y'.

6. I. $x^2-19x+84=0$
   II. $y^2-25y+156=0$
7. I. $9x - 15.45 = 54.55 + 4x$
   II. $\sqrt{(y+155)} - \sqrt{36} = \sqrt{49}$
8. I. $(x-8)(2y+9)=25$
   II. $(2x-16)(y-4)=8$
9. I. $6x^2+19x+15=0$
   II. $24y^2+11y+1=0$
10. I. $8x^2 + 26x + 15 = 0$
    II. $4y^2 + 24y + 35 = 0$

Direction (11-15): Two equations (I) and (II) are given in each question. On the basis of these equations. You have to decide the relation between 'x' and 'y' and give answer.

a. x > y

b. x < y

c. x ≤ y

d. x ≥ y

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e. x = y or no relation can be decided between 'x' and 'y'.

11. I. $2x^2 - x - 231 = 0$
    II. $2y^2 + 43y + 231 = 0$
12. I. $6x^2 - 19x - 36 = 0$
    II. $4y^2 - 47y + 120 = 0$
13. I. $9x^2 - 94.5x + 243 = 0$
    II. $4.5y^2 - 13.5y - 486 = 0$
14. I. $5x^2 + 29x + 20 = 0$
    II. $25y^2 + 25y + 6 = 0$
15. I. $16x^2 + 20x + 6 = 0$
    II. $10y^2 + 38y + 24 = 0$

Direction (16-20): Two equations (I) and (II) are given in each question. On the basis of these equations. You have to decide the relation between 'x' and 'y' and give answer.

a. x > y

b. x < y

c. x ≤ y

d. x ≥ y

e. x = y or no relation can be decided between 'x' and 'y'.

16. I. $21x^2 - 122x + 165 = 0$
    II. $3y^2 - 2y - 33 = 0$
17. I. $17x^2 + 48x = 9$
    II. $13y^2 = 32y - 12$
18. I. $x^2 - 3481 = 0$
    II. $y^2 - 118y + 3481 = 0$
19. I. $14x^2 - 37x + 24 = 0$
    II. $28y^2 - 53y + 24 = 0$
20. I. $9x^2 - 45x + 56 = 0$
    II. $4y^2 - 17y + 18 = 0$

Direction (21-25): Two equations (I) and (II) are given in each question. On the basis of these equations. You have to decide the relation between 'x' and 'y' and give answer.

a. x > y

b. x < y

c. x ≤ y

d. x ≥ y

e. x = y or no relation can be decided between 'x' and 'y'.

21. I. $3x + 2y = 301$
    II. $7x - 5y = 74$
22. I. $12x^2 - 41x + 35 = 0$
    II. $3y^2 - 17y - 28 = 0$
23. I. $5x^2 - 87x + 378 = 0$
    II. $3y^2 - 49y + 200 = 0$
24. I. $88x^2 - 19x + 1 = 0$
    II. $132y^2 - 23y + 1 = 0$
25. I. $11x + 5y = 117$
    II. $7x + 13y = 153$

Direction (26-30): Two equations (I) and (II) are given in each question. On the basis of these equations. You have to decide the relation between 'x' and 'y' and give answer.

a. x > y

b. x < y

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c. $x \leq y$

d. $x \geq y$

e. x = y or no relation can be decided between 'x' and 'y'.

26. I. $x^2-15x-364 = 0$
    II. $y^2+31y+240 = 0$

27. I. $13x - 8y + 81 = 0$
    II. $15x + 5y + 65 = 0$

28. I. $x^2 - 208 = 233$
    II. $y^2 + 47 - 371 = 0$

29. I. $8x^2 + 78x + 169 = 0$
    II. $20y^2 - 117y + 169 = 0$

30. I. $8x + 13y = 62$
    II. $13x - 17y + 128 = 0$

Direction (31-35): Two equations (I) and (II) are given in each question. On the basis of these equations. You have to decide the relation between 'x' and 'y' and give answer.

a. x > y

b. x < y

c. $x \leq y$

d. $x \geq y$

e. x = y or no relation can be decided between 'x' and 'y'.

31. I. $35x^2 - 53x + 20 = 0$
    II. $56y^2 - 97y + 42 = 0$

32. I. $42x - 17y = -67$
    II. $7x + 12y = -26$

33. I. $x^2-50x+621 = 0$
    II. $y^2-42y+437 = 0$

34. I. $p^2 - 26p + 168 = 0$
    II. $q^2 - 25q + 156 = 0$

35. I. $x^2 - 82x + 781 = 0$
    II. $y^2 = 5041$

Direction (36-40): Two equations (I) and (II) are given in each question. On the basis of these equations. You have to decide the relation between 'x' and 'y' and give answer.

a. x > y

b. x < y

c. $x \leq y$

d. $x \geq y$

e. x = y or no relation can be decided between 'x' and 'y'.

36. I. $9x^2 - 114x + 361 = 0$
    II. $y^2 = 36$

37. I. $x^2 - 19x + 84 = 0$
    II. $y^2 - 25y + 156 = 0$

38. I. $x^2 = 484$
    II. $y^2 - 45y + 506 = 0$

39. I. $5x + 2y = 96$
    II. $3(7x + 5y) = 489$

40. I. $3x^2 - 29x + 56 = 0$
    II. $3y^2 - 5y - 8 = 0$

Direction (41-45): Two equations (I) and (II) are given in each question. On the basis of these equations. You have to decide the relation between 'x' and 'y' and give answer.

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a. x > y

b. x < y

c. x ≤ y

d. x ≥ y

e. x = y or no relation can be decided between 'x' and 'y'.

41. I. $7x + 3y = 77$
    II. $2x + 5y = (2601)^{1/2}$

42. I. $x^2–33x–270 = 0$
    II. $y^2-37y+342 = 0$

43. I. $x^2 - 87x–270 = 0$
    II. $7y^2 –11y–18 = 0$

44. I. $679x^2 - 168x^2 = 3066$
    II. $\sqrt{144y^3}– 9y^3=1536$

45. I. $x^2 – 51x-630=0$
    II. $y^2+ 52y+640=0$

Direction (46-50): Two equations (I) and (II) are given in each question. On the basis of these equations. You have to decide the relation between 'x' and 'y' and give answer.

a. x > y

b. x < y

c. x ≤ y

d. x ≥ y

e. x = y or no relation can be decided between 'x' and 'y'.

46. I. $x^2-259=1037$
    II. $y^2-359=1241$

47. I. $8x + 6y = 52$
    II. $7x + 5y = 45$

48. I. $x^3-1650=7611$
    II. $y^3-2013=2900$

49. I. $x^2+33x-540=0$
    II. $y^2+36y+320=0$

50. I. $x^2-32x+256=0$
    II. $y^2-33y+272=0$

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Answers with Solution

Solution (1-5)

1. C

$x^2-6x+135 = 0$

$x^2-15x+9x+135 = 0$

$x = +15, -9$

$y^2-30y+225 = 0$

$y^2-15y-15y+225 = 0$

$y = +15, +15$

Hence, $x \leq y$

2. E

I. $6x^2+77x+121=0$

or,$6x^2+66x+11x+121=0$

or,$6x(x+11)+11(x+11)=0$

or,$(6x+11)(x+11)=0$ or,$x=-11/6,-11$

II. $y^2+9y-22=0$

or,$y^2+11y-2y-22=0$

or,$y(y+11)-2(y+11)$

or,$(y-2)(y+11)=0$

or,$y=2,-11$

Hence, no relationship can be established between x and y.

3. A

$(x-8)(2y+9) = 25$

$2xy+9x-16y-72 = 25$

$2xy+9x-16y = 97$(equation 1)

$(2x-16)(y-4) = 8$

$2xy-8x-16y+64 = -56$ (equation 2)

By solving both equations, we get

X= 9

Y = 8

Hence, X>Y

4. A

I. $x^2-15x-364 = 0$

$x^2-28x+13x-364 = 0$

$x = +28, -13$

II. $y^2+31y+240 = 0$

$y^2+15y+16y+240 = 0$

$y = -15, -16$

Hence, x>y

5. A

$x^2 - 43x+ 462 = 0$

$x^2 - 22x-21x+ 462 = 0$

$x = +22 , +21$

$y^2-37y+342 = 0$

$y^2-19y-18y+342 = 0$

$y = +19, +18$

Hence, x>y

Solution (6-10)

6. C

I. $x^2-19x+84=0$

$x^2-7x-12x+84=0$

$(x-7)(x-12)=0$

$\therefore x=7,12$

II. $y^2-25y+156=0$

$y^2-13y-12y+156=0$

$(y-13)(y-12)=0$

$\Rightarrow y=13,12$

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∴x≤y

7. E

x = 14

y = 14

x = y

8. A

I. (x–8) (2y+9) = 25

II. (2x–16) (y–4) = 8

I. 2xy+9x–16y–72 = 25

II. 2xy–8x–16y+64 = 8

X= 9

Y = 8

Hence, X>Y

9. B

I. $6x^2+19x+15=0$

⇒ (2x+3)(3x+5)

⇒ x=–3/2,–5/3

II. $24y^2+11y+1=0$

(3y+1)(8y+1)=0

y=–1/8,–1/3

⇒x<y

10. D

I. $8x^2+26x+15=0$

⇒ $8x^2+20x+6x+15=0$

⇒ (2x+5)(4x+3)=0

⇒ x=–5/2,–3/4

II. $4y^2+24y+35=0$

$4y^2+10y+14y+35=0$

(2y+5)(2y+7)=0

y=–5/2,–7/2

⇒x≥y

Solution (11-15)

11. D

$2x^2 - x - 231 = 0$

$\Rightarrow 2x^2 - 22x + 21x - 231 = 0$

$\Rightarrow 2x(x - 11) + 21(x - 11) = 0$

$\Rightarrow (x - 11)(2x + 21) = 0$

$\Rightarrow x = 11, \frac{-21}{2}$

$2y^2 + 43y + 231 = 0$

$\Rightarrow 2y^2 + 22y + 21y + 231 = 0$

$\Rightarrow 2y(y + 11) + 21(y + 11) = 0$

$\Rightarrow (y + 11)(2y + 21) = 0$

$\Rightarrow y = -11, \frac{-21}{2}$

$x \geq y$

12. E

I. $6x^2–19x–36 = 0$

$6x^2–27x+8x–36 = 0$

x = +27/6 = + 4.5

x = – 8/6 = –1.33

II. $4y^2–47y+120 = 0$

$4y^2–32y–15y+120 = 0$

y = +32/4 = +8

y = +15/4 = +3.75

No relation

13. E

I. $9x^2 - (54 + 40.5)x + 243 = 0$

$x = 6, 4.5$

II. $4.5y^2 - 54y + 40.5y - 486 = 0$

$y = 12, -9$

No relation

14. B

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I. $5x^2 + 29 + 20 = 0$
$\Rightarrow 5x^2 + 25x + 4x + 20 = 0$
$\Rightarrow (x + 5)(5x + 4) = 0$
$\Rightarrow x = -5, -4/5$
II. $25y^2 + 25y + 6 = 0$
$\Rightarrow 25y^2 + 15y + 10y + 6 = 0$
$\Rightarrow (5y + 3)(5y + 2) = 0$
$\Rightarrow y = -3/5, -2/5$
$y > x$

15. A

I. $8x^2 + 10x + 3 = 0$
$\Rightarrow 8x^2 + 4x + 6x + 3 = 0$
$\Rightarrow (2x + 1)(4x + 3) = 0$
$\Rightarrow x = -\frac{1}{2}, -\frac{3}{4}$
II. $5y^2 + 19y + 12 = 0$
$\Rightarrow 5y^2 + 15y + 4y + 12 = 0$
$\Rightarrow (y + 3)(5y + 4) = 0$
$\Rightarrow (y + 3)(5y + 4) = 0$
$\Rightarrow y = -3, -\frac{4}{5}$
$x > y$

Solution (16-20)

16. E

by solving I

x=45/21,77/21=15/7,11/3

by solving 2

y=11/3,-9/3=11/3,-3

so no relation

17. B

I. $17x^2 + 48x = 9$
$\Rightarrow 17x^2 + 48x - 9 = 0$
$\Rightarrow 17x^2 + 51x - 3x - 9 = 0$
$\Rightarrow (x + 3)(17x - 3) = 0$
$\Rightarrow x = -3, \frac{3}{17}$
II. $13y^2 - 32y + 12 = 0$
$\Rightarrow 13y^2 - 26y - 6y + 12 = 0$
$\Rightarrow (y - 2)(13y - 6) = 0$
$\Rightarrow y = 2, \frac{6}{13}$
$y > x$

18. C

I. $x^2 - 3481=0$

$x^2 = 3481$

$x = \pm 59$

II. $y^2 - 118y + 3481=0$

$y^2 - 59y - 59y + 3481=0$

$y = +59, +59$

Hence, $x \leq y$

19. D

$14x^2 - 37x + 24 = 0$

$14x^2 - 21x - 16x + 24 = 0$

$7x(2x - 3) - 8(2x - 3)$

x =3/2,8/7

$28y^2 - 53y + 24 = 0$

$28y^2 - 32y - 21y + 24 = 0$

$4(7y - 8) - 3(7y - 8) = 0$

y =8/7,3/2 so x>=y

20. B

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I. $9x^2 - 45x + 56 = 0$
$\Rightarrow 9x^2 - 24x - 21x + 56 = 0$
$\Rightarrow 3x(3x - 8) - 7(3x - 8) = 0$
$\Rightarrow (3x - 8)(3x - 7) = 0$
$\Rightarrow x = 8/3, 7/3$
II. $4y^2 - 17y + 18 = 0$
$\Rightarrow 4y^2 - 8y - 9y + 18 = 0$
$\Rightarrow (y - 2)(4y - 9) = 0$
$\Rightarrow y = 2, 9/4$

Solution (21-25)

21. B

5 (3x + 2y = 301)

2 (7x – 5y = 74)

15x + 10y = 1505

14x – 10y = 148

29x = 1653

x = 57, y = 65

22. E

$12x^2 - 41x + 35 = 0$

$= 12x^2 - 20x - 21x + 35 = 0,$

$= 4x(3x - 5) - 7(3x - 5) = 0,$

$= (4x - 7)(3x - 5) = 0,$

x = 7/4, 5/3

$3y^2 - 17y - 28 = 0$

$3y^2 - 21y + 4y - 28 = 0$

$3y(y - 7) + 4(y - 7) = 0$

$(y - 7)(3y + 4) = 0$

y = 7, -4/3

ie. no relation between 'x'and 'y'.

23. A

$5x^2 - 87x + 378 = 0$

$5x^2 - 42x - 45x + 378 = 0$

x =42/5,45/5

= 8.4, 9

$3y^2 - 49y + 200 = 0$

$3y^2 - 24y - 25y + 200 = 0$

x =24/3,25/3= (8, 8.33)

24. D

I. $88x^2 - 19x + 1 = 0$
$\Rightarrow (8x - 1)(11x - 1) = 0$
$\Rightarrow x = \frac{1}{8}, \frac{1}{11}$
II. $132y^2 - 23y + 1 = 0$
$\Rightarrow (11y - 1)(12y - 1) = 0$
$\Rightarrow y = \frac{1}{11}, \frac{1}{12}$
$\Rightarrow x \geq y$

25. B

eqn (I) × 7
eqn (II) × 11

$$77x + 35y = 819$$
$$-77x \pm 143y = 1683$$
$$-108y = -864$$

$\therefore y = 8, x = 7$ ie $x < y$

Solution (26-30)

26. A

I. $x^2 - 15x - 364 = 0$

$x^2 - 28x + 13x - 364 = 0$

x = +28, –13

II. $y^2 + 31y + 240 = 0$

$y^2 + 15y + 16y + 240 = 0$

y = –15, –16

Hence, x>y

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27. B

eqn (I) × 5 + eqn (II) × 8

65x - 40y + 405 = 0

120x + 40y + 520 = 0

185x + 0 + 925 = 0

$$\therefore x = \frac{-925}{185} = -5$$

$$y = \frac{13x + 81}{8}$$

$$= \frac{-65 + 81}{8} = \frac{16}{8} = 2$$

$\therefore x < y$

28. E

I. $x^2 - 208 = 233$

$\Rightarrow x^2 = 441$

$\Rightarrow x = 21, -21$

II. $y^2 + 47 - 371 = 0$

$\Rightarrow y^2 = 324$

$\Rightarrow y = 18, -18$

No relation between x and y

29. B

x = –13/4, –13/2

y =13/5, 13/4

30. B

On solving these two equations, we get

x = -2, y = 6

ie, x < y

Solution (31-35)

31. B

I. $35x^2 - 28x - 25x + 20 = 0$

or $7x(5x - 4) - 5(5x - 4) = 0$

or $(7x - 5)(5x - 4) = 0$ x =5/7 , 4/5

II. $56y^2 - 48y - 49y + 42 = 0$

or $8y(7y - 6) - 7(7y - 6) = 0$

or $(8y - 7)(7y - 6) = 0$

y = 7/8 , 6/7

32. B

42x - 17y = -67

42x + 72y = -156 eqn (II) × 6

- - + .

-89y = 89

$$\therefore y = \frac{-89}{89} = -1 \text{ and } x = -2$$

$\therefore x < y$

33. D

I. $x^2 - 50x + 621 = 0$

$x^2 - 23x - 27x + 621 = 0$

x = +23, +27

II. $y^2 - 42y + 437 = 0$

$y^2 - 19y - 23y + 437 = 0$

y = +19, +23

Hence, x≥y

34. E

I. $p^2 - 26p + 168 = 0$

$\Rightarrow p^2 - 12p - 14p + 168 = 0$

$\Rightarrow p(p - 12) - 14(p - 12) = 0$

$\Rightarrow (p - 12)(p - 14) = 0$

$\therefore p = 12, 14$

II. $q^2 - 25q + 156 = 0$

$\Rightarrow q^2 - 13q - 12q + 156 = 0$

$\Rightarrow q(q - 13) - 12(q - 13) = 0$

$\Rightarrow (q - 12)(q - 13) = 0$

$\therefore q = 12, 13$

Hence, no relation can be established between p and q

35. E

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I. $x^2 - 11x - 71x + 781 = 0$
or $x(x - 11) - 71(x - 11) = 0$
or $(x - 11)(x - 71) = 0$
$\therefore x = 11, 71$
II. $y^2 = 5041$
$\therefore y = \pm 71$

Solution (36-40)

36. A

I. $9x^2 - 114x + 361 = 0$
or $(3x - 19)^2 = 0$
$\therefore 3x - 19 = 0$

$\therefore x = \frac{19}{3} = 6.33$

II. $y^2 = 36$
$\therefore y = \pm 6$
$\therefore x > y$

37. C

$x^2 - 19x + 84 = 0$
$\Rightarrow x^2 - 12x - 7x + 84 = 0$
$\Rightarrow (x - 12)(x - 7) = 0$
$\Rightarrow x = 12, 7$
$y^2 - 25y + 156 = 0$
$\Rightarrow y^2 - 13y - 12y + 156 = 0$
$\Rightarrow (y - 13)(y - 12) = 0$
$\Rightarrow y = 13, 12$
$y \geq x$

38. C

I. $x^2 = 484$
$\therefore x = \pm 22$
II. $y^2 - 45y + 506 = 0$
or $y^2 - 22y - 23y + 506 = 0$
or $y(y - 22) - 23(y - 22) = 0$
or $(y - 22)(y - 23) = 0$
$\therefore y = 22, 23$
$\therefore x \leq y$

39. A

$5x + 2y = 96$ ... (i)
$21x + 15y = 489$ ... (ii)
Now, eqn (i) × 15 and eqn (ii) × 2
$75x + 30y = 1440$
$42x + 30y = 978$
$33x = 462$
$\therefore x = 14$
Putting the value of x in eqn (i), we get
$5 \times 14 + 2y = 96$ or, $2y = 96 - 70 = 26$

or, $y = \frac{26}{2} = 13$
$\therefore x > y$

40. D

I. $3x^2 - 29x + 56 = 0$
or $3x^2 - 21x - 8x + 56 = 0$
or $3x(x - 7) - 8(x - 7) = 0$
or $(3x - 8)(x - 7) = 0$

$\therefore x = \frac{8}{3}, 7$

II. $3y^2 - 5y - 8 = 0$
or $3y^2 + 3y - 8y - 8 = 0$
or $3y(y + 1) - 8(y + 1) = 0$
or $(3y - 8)(y + 1) = 0$
or $(3y - 8)(y + 1) = 0$

$\therefore y = -1, \frac{8}{3}$

$\therefore x \geq y$

Solution (41-45)

41. A

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I. $7x + 3y = 77$ ... (i)

II. $2x + 5y = (2601)^{\frac{1}{2}} = 51$ ...(ii)

Now, $7x + 3y = 77$ ... (i) × 5

$2x + 5y = 51$ ... (ii) × 3

or, $35x + 15y = 385$

$6x + 15y = 153$

$29x = 232$

$$\therefore x = \frac{232}{29} = 8$$

Putting the value of x in equation (i), we have

$7 \times 8 + 3y = 77$

or, $3y = 77 - 56 = 21$

$$\text{or, } y = \frac{21}{3} = 7$$

Hence, x > y

42. C

$x^2 – 33x + 270 = 0$

$x^2 – 18x – 15x + 270 = 0$

$x = +18, +15$

$y^2 – 37y + 342 = 0$

$y^2 – 18y – 19y + 342 = 0$

$y = +18, +19$

Hence, $x \leq y$

43. E

$x^2 – 87x – 270 = 0$

$\Rightarrow x^2 – 90x + 3x – 270 = 0$

$\Rightarrow x(x – 90) + 3(x – 90) = 0$

$\Rightarrow (x – 90)(x + 3) = 0$

$\Rightarrow x = 90, –3$

$7y^2 – 11y – 18 = 0$

$\Rightarrow 7y^2 – 18y + 7y – 18 = 0$

$\Rightarrow y(7y – 18) + 1(7y – 18) = 0$

$\Rightarrow (7y – 18)(y + 1) = 0$

$\Rightarrow y = –1, \frac{18}{7}$

No relation

44. B

I. $511x^2 = 3066$

$$\text{or, } x^2 = \frac{3066}{511} = 6$$

$$\therefore x = \pm\sqrt{6}$$

II. $12y^3 - 9y^3 = 1536$

or, $3y^3 = 1536$

$$\text{or, } y^3 = \frac{1536}{3} = 512 = 8^3$$

$\therefore y = 8$ Hence, $x < y$

45. A

$X^2 – 51x - 630 = 0$

$(X-30)(X-21) = 0$

$X = 30, 21$

$Y^2 + 52y - 640 = 0$

$(Y+32)(Y+20) = 0$

$Y = -32, -20$

Solution (46-50)

46. E

$x^2 - 259 = 1037$

$x^2 = 1296$

$x = \pm 36$

$y^2 - 359 = 1241$

$y^2 = 1600$

$y = \pm 40$

47. A

I. $8x + 6y = 52$

II. $7x + 5y = 45$

By solving both the equations, we get

$x = 5$

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y = 2

Hence, x>y

48. A

x^3-1650=7611

x^3=9261

x=21

y^3-2013=2900

y^3=4913

y=17

49. E

x^2+33x-540=0

(x-12)(x+45)=0

x=12,-45

y^2+36y+320=0

(y+16)(y+20)=0

y=-16,-20

50. C

I. x^2-32x +256 =0

=> $(x-16)^2$ =0

=> x = 16,16

II. y^2– 33y + 272 =0

=> (y-16)(y-17)=0

=> y =16,17

So, x ≤ y

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