

TSI 31 Multiple Choice

TSI 31 STEP
~~08-02-17~~
11-02-17

1. Solve $x^2 + 2x + 10 = 0$ (use Quadratic Formula)
 - (a) $\{-5 - 3i, -5 + 3i\}$
 - (b) $\{2 - 3i, 2 + 3i\}$
 - (c) $\{-1 - 3i, -1 + 3i\}$
 - (d) $\{1 - 3i, 1 + 3i\}$
2. Solve $(x + 2)^2 = 7$
 - (a) $\{-5 - \sqrt{3}, -5 + \sqrt{3}\}$
 - (b) $\{3 + \sqrt{2}, 3 - \sqrt{2}\}$
 - (c) $\{-2 - \sqrt{7}, -2 + \sqrt{7}\}$
 - (d) $\{2 - \sqrt{7}, 2 + \sqrt{7}\}$
3. Solve $(x - 2)^2 + 5 = 0$
 - (a) $\{-5, 5\}$
 - (b) $\{2, 5\}$
 - (c) $\{2 - \sqrt{5}, 2 + \sqrt{5}\}$
 - (d) $\{2 - \sqrt{3}, 2 + \sqrt{3}\}$
4. Solve $\frac{1}{x} = \frac{x}{5}$
 - (a) $\{1, -5\}$
 - (b) $\{-5, 5\}$
 - (c) $\{-\sqrt{5}, \sqrt{5}\}$
 - (d) $\{-\sqrt{3}, \sqrt{3}\}$
5. Solve $7x^2 = 1$
 - (a) $\{-\sqrt{7}, \sqrt{7}\}$
 - (b) $\left\{-\sqrt{\frac{1}{3}}, \sqrt{\frac{1}{3}}\right\}$
 - (c) $\left\{-\sqrt{\frac{1}{7}}, \sqrt{\frac{1}{7}}\right\}$
 - (d) $\left\{-\frac{1}{7}, \frac{1}{7}\right\}$
6. Solve for r , $A = \pi r^2$
 - (a) $r = \pi\sqrt{3A}$
 - (b) $r = \sqrt{\pi A}$
 - (c) $r = \sqrt{\frac{A}{\pi}}$
 - (d) $r = \pi A$
7. If the area of a square is 100 and each side has a length of $2x$, then find x .
 - (a) $x = 2$
 - (b) $x = 10$
 - (c) $x = 5$
 - (d) $x = 6$
8. Solve $\begin{matrix} 3x + y = 7 \\ 5x - y = 9 \end{matrix}$
 - (a) $(x, y) = (-2, 7)$
 - (b) $(x, y) = (5, 9)$
 - (c) $(x, y) = (2, 1)$
 - (d) $(x, y) = (-2, -1)$

9. Solve $\begin{matrix} x + 2y = 7 \\ x - 2y = 3 \end{matrix}$
- (a) $(x, y) = (-2, 7)$ (b) $(x, y) = (-5, -7)$
(c) $(x, y) = (5, 1)$ (d) $(x, y) = (-5, -1)$
10. Solve $\begin{matrix} x - y = 20 \\ x = 3y \end{matrix}$
- (a) $(x, y) = (1, 10)$ (b) $(x, y) = (10, 30)$
(c) $(x, y) = (30, 10)$ (d) $(x, y) = (10, 40)$
11. Solve $\begin{matrix} x - 2y = 4 \\ x - 2y = 5 \end{matrix}$
- (a) $(x, y) = (4, 5)$ (b) $(x, y) = (-4, -5)$
(c) No Solution (d) $(x, y) = (1, 9)$
12. Solve $4^3 = 2^k$
- (a) $k = 2$ (b) $k = 3$
(c) $k = 6$ (d) $k = 4$
13. If a box has 5 red, 3 green, and 4 blue jelly beans, then what is the probability of choosing at random a red jelly bean?
- (a) $\frac{7}{12}$ (b) $\frac{1}{12}$
(c) $\frac{5}{12}$ (d) $\frac{2}{7}$
14. If on a map 1 inch equals 10 miles, then 30 inches equals how many miles?
- (a) 3000 (b) 100
(c) 300 (d) 200
15. If the side of a square is $3x$ and the area is 900, then find x .
- (a) $x = 4$ (b) $x = 2$
(c) $x = 10$ (d) $x = 100$
16. If the perimeter of a rectangle is 160 and the width is 30, then find the area of the rectangle.
- (a) area = 300 (b) area = 3000
(c) area = 1500 (d) area = 150
17. Find $f(8)$ if $f(x) = \frac{\sqrt{x}}{2}$
- (a) $f(8) = 4$ (b) $f(8) = 2$
(c) $f(8) = \sqrt{2}$ (d) $f(8) = 2\sqrt{2}$

18. Solve $\frac{60x}{20} = 18$

(a) $x = 3$

(b) $x = 5$

(c) $x = 6$

(d) $x = 7$

19. Solve $2(x^2 - 6) = 60$

(a) $\{2, 6\}$

(b) $\{-6, 1\}$

(c) $\{-6, 6\}$

(d) $\{6\}$

20. Solve $2(12x^2 + 7x) = 24$

(a) $\left\{\frac{4}{3}, -\frac{3}{4}\right\}$

(b) $\left\{-\frac{4}{3}, -\frac{3}{4}\right\}$

(c) $\left\{-\frac{4}{3}, \frac{3}{4}\right\}$

(d) $\left\{\frac{4}{3}, \frac{3}{4}\right\}$

21. Solve $2x + 40 < x$

(a) $x < 40$

(b) $x < 20$

(c) $x < -40$

(d) $x < -20$

22. If a big hog weighs 8 pounds more than a little hog and 3 times the weight of the little hog equals 2 times the weight of the big hog, then find the weight of the little hog.

(a) 10

(b) 24

(c) 16

(d) 8

23. Solve $x^2 - x = 12$

(a) $\{3, -4\}$

(b) $\{3, 4\}$

(c) $\{-3, 4\}$

(d) $\{-3, -4\}$

24. Solve $x^2 - 16 = 6x$

(a) $\{2, -8\}$

(b) $\{2, 8\}$

(c) $\{-2, 8\}$

(d) $\{-2, -8\}$

25. Solve $x(x - 6) = 7$

(a) $\{1, -7\}$

(b) $\{1, 7\}$

(c) $\{-1, 7\}$

(d) $\{-1, -7\}$

26. Find a common factor for $3y^3 + 2y^2$ and $6y^4 + 4y^3$.

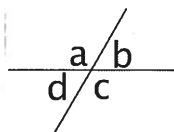
(a) $3y + 5$

(b) $y + 2$

(c) $3y + 2$

(d) $3y + 1$

27. Find the average of a , b , c , and d .



(a) 45

(b) 60

(c) 90

(d) 180

28. For what values is $f(x) = \frac{x-1}{x^2-4}$ undefined?

(a) $\{0, 1\}$

(b) $\{1, -1\}$

(c) $\{-2, 2\}$

(d) $\{-4, 4\}$

29. Solve for x and y

$$\begin{aligned} x + 3y &= 5 \\ 2x - y &= 3 \end{aligned}$$

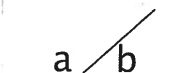
(a) $(x, y) = (2, -1)$

(b) $(x, y) = (-2, 1)$

(c) $(x, y) = (2, 1)$

(d) $(x, y) = (-2, -1)$

30. Find the average of a and b .



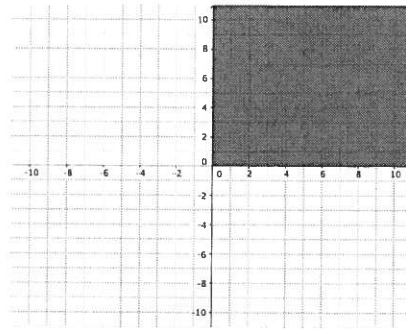
(a) 60

(b) 45

(c) 90

(d) 180

31. If point (a, b) is in the shaded area, then



(a) $a < 0$ and $b > 0$

(b) $a > 0$ and $b < 0$

(c) $a > 0$ and $b > 0$

(d) $a < 0$ and $b < 0$

① solve $x^2 + 2x + 10 = 0$ (use Quadratic formula)
 $a=1, b=2, c=10$

⑥

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(10)}}{2(1)}$$

$$x = \frac{-2 \pm \sqrt{4 - 40}}{2}$$

$$x = \frac{-2 \pm \sqrt{-36}}{2}$$

$$x = \frac{-2 \pm 6i}{2}$$

$$x = -1 \pm 3i$$

$$x = -1 - 3i$$

OR

$$x = -1 + 3i$$

2. Solve $(x+2)^2 = 7$

$$\sqrt{(x+2)^2} = \pm\sqrt{7}$$

$$x+2 = \pm\sqrt{7}$$

$$x+2-x = \pm\sqrt{7} - 2$$

$$x = -2 \pm\sqrt{7}$$

$$x = -2 - \sqrt{7} \text{ OR}$$

$$x = -2 + \sqrt{7}$$

3. Solve $(x-2)^2 - 5 = 0$

$$(x-2)^2 = 5 \quad \text{rewrite}$$

$$\sqrt{(x-2)^2} = \pm\sqrt{5}$$

$$x-2 = \pm\sqrt{5}$$

$$x-2+x = \pm\sqrt{5} + 2$$

$$x = 2 \pm\sqrt{5}$$

$$x = 2 - \sqrt{5} \text{ OR}$$

$$x = 2 + \sqrt{5}$$

4. Solve $\frac{1}{x} = \frac{x}{5}$

$$5(1) = x(x) \text{ cross mult}$$

$$5 = x^2$$

$$\pm\sqrt{5} = \sqrt{x^2}$$

$$\pm\sqrt{5} = x$$

$$x = -\sqrt{5} \text{ OR}$$

$$x = \sqrt{5}$$

5) Solve $7x^2 = 1$

$$\frac{7x^2}{7} = \frac{1}{7}$$

$$x^2 = \frac{1}{7}$$

$$\sqrt{x^2} = \pm \sqrt{\frac{1}{7}}$$

$$x = \pm \sqrt{\frac{1}{7}}$$

$$x = -\sqrt{\frac{1}{7}}$$

or

$$x = \sqrt{\frac{1}{7}}$$

6) Solve for r , $A = \pi r^2$

$$A = \pi r^2$$

$$\frac{A}{\pi} = \frac{\pi r^2}{\pi}$$

$$\frac{A}{\pi} = r^2$$

$$\sqrt{\frac{A}{\pi}} = \sqrt{r^2}$$

$$\sqrt{\frac{A}{\pi}} = r$$

7) The area of a square is ~~100~~ and each side has a length of $2x$, then find x .

$$\begin{array}{c} \square \\ 2x \end{array} 2x$$

$$A = Lw$$

$$A = (2x)(2x) = 100$$

$$4x^2 = 100$$

$$\frac{4x^2}{4} = \frac{100}{4}$$

$$x^2 = 25$$

$$\sqrt{x^2} = \sqrt{25}$$

$$x = 5$$

8.

$$2x + 3y = 7$$

$$5x - y = 9$$

$$(2x + 3y = 7) (1)$$

$$(5x - y = 9) (3)$$

$$2x + 3y = 7$$

$$15x - 3y = 27$$

$$17x = 34$$

$$\frac{17x}{17} = \frac{34}{17}$$

$$x = 2$$

Now Subst

$$2x + 3y = 7$$

$$2(2) + 3y = 7$$

$$4 + 3y = 7$$

$$4 + 3y - 4 = 7 - 4$$

$$3y = 3$$

$$\frac{3y}{3} = \frac{3}{3}$$

$$y = 1$$

$$(x, y) = (2, 1)$$

9

9.

$$x + 2y = 7$$

$$x - 2y = 3$$

$$2x + 0 = 10$$

$$2x = 10$$

$$\frac{2x}{2} = \frac{10}{2}$$

$$x = 5$$

Now Subst

$$x + 2y = 7$$

$$5 + 2y = 7$$

$$5 + 2y - 5 = 7 - 5$$

$$2y = 2$$

$$\frac{2y}{2} = \frac{2}{2}$$

$$y = 1$$

$$(x, y) = (5, 1)$$

10.

$$x - y = 20$$

$$x = 3y$$

$$(3y) - y = 20 \quad \text{Subst}$$

$$3y - y = 20$$

$$2y = 20$$

$$\frac{2y}{2} = \frac{20}{2}$$

$$y = 10$$

$$(x, y) = (10, 30)$$

Subst

$$x = 3y$$

$$x = 3(10)$$

$$x = 30$$

10

11.

$$x - 2y = 4$$

$$x - 2y = 5$$

$$(x - 2y = 4)(-1)$$

$$(x - 2y = 5)(1)$$

$$-x + 2y = -4$$

$$x - 2y = 5$$

$$0 + 0 = 1$$

$$0 \neq 1$$

No solution

12) Solve $4^3 = 2^k$

$$4 \cdot 4 \cdot 4 = 2^k$$

$$64 = 2^k$$

$$2^6 = 2^k \text{ rewrite}$$

$$6 = k$$

13) If a box has 5 red, 3 green, and 4 blue jelly beans, then what is the probability of choosing at random a red jelly bean?

$$\frac{\text{red}}{\text{red} + \text{green} + \text{blue}} =$$

$$\frac{5}{5 + 3 + 4} =$$

$$\frac{5}{12} =$$

14) If on a map 1 inch equals 10 miles, then 30 inches equals how many miles?

$$\frac{1}{10} = \frac{30}{x}$$

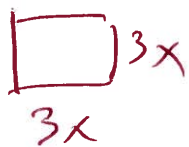
$$1(x) = 10(30)$$

$$1x = 300$$

$$x = 300$$

- 15) If the side of a square is $3x$, and the area is 900, then find x .

12



$$A = L \cdot W$$

$$A = (3x)(3x) = 900$$

$$9x^2 = 900$$

$$\frac{9x^2}{9} = \frac{900}{9}$$

$$x^2 = 100$$

$$\sqrt{x^2} = \sqrt{100}$$

$$x = 10$$

- 16) If the perimeter of a rectangle is 160 and the width is 30, then find the area of the rectangle.



$$P = 2L + 2W$$

$$160 = 2L + 2(30)$$

$$160 = 2L + 60$$

$$160 - 60 = 2L + 60 - 60$$

$$100 = 2L$$

$$\frac{100}{2} = \frac{2L}{2}$$

$$50 = L$$

Area

$$A = LW$$

$$A = (50)(30)$$

$$A = 1500$$

(17) Find $f(8)$ if $f(x) = \frac{\sqrt{x}}{2}$

$$f(8) = \frac{\sqrt{8}}{2}$$

$$f(8) = \frac{\sqrt{4 \times 2}}{2}$$

$$f(8) = \frac{\sqrt{4} \sqrt{2}}{2}$$

$$f(8) = \frac{2\sqrt{2}}{2}$$

$$f(8) = \sqrt{2}$$

Primes 2, 3, 5, 7...

$$\begin{array}{r} 2 \overline{) 8} \\ 2 \overline{) 4} \\ 2 \overline{) 2} \\ 1 \end{array}$$

$$8 = 2 \cdot 2 \cdot 2$$

(13)

(18) Solve

$$\frac{60x}{20} = 18$$

$$3x = 18$$

$$\frac{3x}{3} = \frac{18}{3}$$

$$x = 6$$

(19) Solve $2(x^2 - 6) = 60$

$$\frac{2(x^2 - 6)}{2} = \frac{60}{2}$$

$$x^2 - 6 = 30$$

$$x^2 - 6 + 6 = 30 + 6$$

$$x^2 = 36$$

$$\sqrt{x^2} = \pm \sqrt{36}$$

$$x = \pm 6$$

$$x = -6$$

$$\text{OR } x = 6$$

20 Solve $2(12x^2 + 7x) = 24$

$$\frac{2(12x^2 + 7x)}{2} = \frac{24}{2}$$

$$12x^2 + 7x = 12$$

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

$$(3x+4)(4x-3) = 0$$

Let $3x+4=0$ OR $4x-3=0$

$$3x+4-4=0-4 \quad \text{OR} \quad 4x-3+3=0+3$$

$$3x = -4 \quad \text{OR} \quad 4x = 3$$

$$\frac{3x}{3} = \frac{-4}{3} \quad \text{OR} \quad \frac{4x}{4} = \frac{3}{4}$$

$$x = -\frac{4}{3} \quad \text{OR} \quad x = \frac{3}{4}$$

Solve $12x^2 + 7x - 12 = 0$ (use Quadratic formula)

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(12)(-4)}}{2(12)}$$

$$x = \frac{-7 \pm \sqrt{49 + 576}}{24}$$

$$x = \frac{-7 \pm \sqrt{625}}{24}$$

$$x = \frac{-7 \pm 25}{24}$$

$$x = \frac{-7-25}{24} \quad \text{OR} \quad x = \frac{-7+25}{24}$$

$$x = -\frac{32}{24} \quad \text{OR} \quad x = \frac{18}{24}$$

possible

$$\begin{array}{r} 12 \cdot 1 \\ 6 \cdot 2 \\ 3 \cdot 4 \end{array}$$

$$\begin{array}{r} 12 \cdot 1 \\ 6 \cdot 2 \\ 3 \cdot 4 \end{array}$$

14.

$$x = \frac{-(-4)}{4+3} \quad \text{OR} \quad x = \frac{6(3)}{6(4)}$$

$$x = -\frac{4}{3}$$

$$x = \frac{3}{4}$$

(21)

Solve

$$2x + 40 < x$$

$$2x + 40 - 40 < x - 40$$

$$2x < x - 40$$

$$2x - x < x - 40 - x$$

$$1x < -40$$

$$x < -40$$

(15)

(22) If a big hog weighs 8 pounds more than a little hog and 3 times the weight of the little hog equals 2 times the weight of the big hog, then find the weight of the little hog.

let x = weight of little hog

let $x + 8$ = weight of big hog

$$3(x) = 2(x + 8)$$

$$3x = 2x + 16$$

$$3x - 2x = 2x + 16 - 2x$$

$$x = 16$$

(23)

Solve

$$x^2 - x = 12$$

$$x^2 - x - 12 = 0$$

$$(x+3)(x-4) = 0$$

$$\text{or } x+3=0 \quad \text{or } x-4=0$$

$$x+3-3=0-3 \quad \text{or } x-4+4=0+4$$

$$x = -3 \quad \text{or } x = 4$$

Possible

12.1

3.4

6.2

(16)

(24)

Solve

$$x^2 - 16 = 6x$$

$$x^2 - 6x - 16 = 0$$

$$(x+2)(x-8) = 0$$

$$\text{or } x+2=0 \quad \text{or } x-8=0$$

$$x+2-2=0-2 \quad \text{or } x-8+8=0+8$$

$$x = -2 \quad \text{or } x = 8$$

16.1

Possible

2.8

44

(25)

Solve

$$x(x-6) = 7$$

$$x^2 - 6x = 7$$

$$x^2 - 6x - 7 = 0$$

$$(x+1)(x-7) = 0$$

$$\text{or } x+1=0 \quad \text{or } x-7=0$$

$$x+1-1=0-1 \quad \text{or } x-7+7=0+7$$

$$x = -1 \quad \text{or } x = 7$$

(26) Find a common factor
 $3y^3 + 2y^2$ and $6y^4 + 4y^3$
 $y^2(3y+2)$ and $2y^3(3y+2)$
 $y \cdot y \cdot (3y+2)$ and $2 \cdot y \cdot y \cdot y (3y+2)$

thus a common factor is $3y+2$

(27) Find the average of a, b, c , and d .
 $a+b+c+d = 360$

$$\frac{a+b+c+d}{4} = \frac{360}{4}$$

$$\frac{a+b+c+d}{4} = 90$$

$$\frac{a/b}{d/c}$$

(28) For what values is $f(x) = \frac{x-1}{x^2-4}$ undefined?

$$\text{Let } x^2 - 4 = 0$$

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

$$(x+2)(x-2) = 0$$

$$x+2=0 \text{ OR } x-2=0$$

$$x+2-2=0-2 \text{ OR } x-2+2=0+2$$

$$x = -2 \text{ OR } x = 2$$

(29)

$$x + 3y = 5$$

$$2x - y = 3$$

$$(x + 3y = 5) \times 1$$

$$(2x - y = 3) \times 3$$

$$1x + 3y = 5$$

$$6x - 3y = 9$$

$$7x = 14$$

$$\frac{7x}{7} = \frac{14}{7}$$

$$x = 2$$

Subst

$$x + 3y = 5$$

$$2 + 3y = 5$$

$$2 + 3y - 2 = 5 - 2$$

$$3y = 3$$

$$\frac{3y}{3} = \frac{3}{3}$$

$$y = 1$$

$$(x, y) = (2, 1)$$

$$\frac{a}{b}$$

(30)

Find the average of a and b.

$$a + b = 180$$

$$\frac{a+b}{2} = \frac{180}{2}$$

$$\frac{a+b}{2} = 90$$

(31)

If point (a, b) is in the shaded area then

$$a > 0 \text{ and } b > 0$$

example
point $(3, 2)$