Solving linear equations and linear inequality

1) $5x + 7 > 5x + 2$

The above linear inequality has which of the following solutions? (easy no cal)

A $x > 7/2$

B $X < 2/7$

C zero solutions

D all real numbers

Sol : $5x + 7 > 5x + 2$

$7 > 2$ is true for all real numbers

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2) $3x + 4(x-2) = 5x + 2(x-4)$

The above linear equality has which of the following solutions ? (easy no cal)

A $x = 2$

B $X = 3$

C zero solutions

D all real numbers

Sol : $3x + 4(x-2) = 5x + 2(x-4)$

$7x - 8 = 7x - 8$; true for all real numbers

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3) $3x - 4 + 2(x + 7) = 3 + 5(x + 2)$

The above linear equality has which of the following solutions? (easy no cal)

A $x = 5$

B $x = 3$

C zero solutions

D all real solutions

Sol : $3x - 4 + 2(x + 7) = 3 + 5(x + 2)$

$5x + 10 = 5x + 13$; $10 = 13$;

Zero solutions

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4) $x + 3(x+ 2) > 2x + 2(x+4)$

the above linear inequality has which of the following solutions? (easy no cal)

A $x > 2$

B $x < 3$

C zero solutions

D all real solutions

Sol :

$x + 3(x+ 2) > 2x + 2(x+4)$

$4x + 6 > 4x + 8$; $6 > 8$; zero solutions

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5) if $(x / 3) – (2x /5) = 3$ what is the value of x? (medium no cal)

A 45

B -45

C 60/11

D -60/11

Sol : $(x / 3) – (2x /5) = 3$; $(5x – 6x) /15 = 3$; $-x = 45$; $x = -45$

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6) if $(x-1)/5 + (x+1)/7 = 2/7$ what is the value of x? (simple no cal)

A 1

B 2

C 3

D 4

Sol : $(x-1)/5 + (x+1)/7 = 2/7$; $(7x -7 + 5x + 5)/35 = 2/7$; $12x -2 = 10$; $x = 1$

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7) how many real solutions are there for the equation below? (medium no cal)

$1/(x-1) = 1/(x+1) + 2x/(x^2 -1)$

A 0

B 1

C 2

D 3

Sol : $1/(x-1) - 1/(x+1) = 2x/(x^2 -1)$; $(x+1-x+1)/(x^2 -1) = 2x/(x^2 -1)$; $2 = 2x$; $x = 1$ which can't be the solution because denominator is zero.

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8) How many real solutions are there for the equation below? (hard cal)

$1/x + 1/(x + 1) = (x^2 +2)/(x^2 +x)$

A 0

B 1

C 2

D 3

Sol : $(2x + 1) / (x^2 +x) = (x^2 +2)/(x^2 +x)$; $2x + 1 = x^2 +2$; $(x-1)^2 =0$; $x = 1$

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9) If $(2x +3)/(3x+1) = (4x -1) /6x$ what is the value of x? (medium cal)

A 1/17

B -1/17

C 2/17

D -2/17

Sol : $(2x +3)(6x = (4x-1) (3x +1)$; $(12x^2 + 18x = 12x^2 + x -1)$; $17x = -1$; $x = -1/17$

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10) If $6 \leq 3x$ then which of the following expression is true about $7-4x$? (medium cal)

A $7-4x \leq -1$

B $7-4x \geq -1$

C $7-4x \leq -2$

D $7-4x \geq -2$

Sol : $6 \leq 3x$; $x \geq 2$; $-4x \leq -8$; $7-4x \leq -1$

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11) If $-3 = -s +27$ then what is the value of $-1 + 2(20 - s/3)$? (medium cal)

A 9

B 19

C 39

D 49

Sol : $-3 = -s +27$; $s = 30$; $-1 + 2(20 - s/3) = -1 + 2(20 -30/3) = -1 + 20 = 19$

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12) If $6p +6 = 3 - p +10p$ what is the value of $p-3$? (easy nocal)

A $p-3 = 2$

B $p-3 = 1$

C $p-3 = -1$

D $p-3 = -2$

Sol : $6p +6 = 3 - p +10p$; $3 = 3p$; $p = 1$;

$p-3 = 1-3 = -2$

13) If ½ + 3(p/5) = 2(p/3) –p what is the value of p ? (medium no cal)

A 0

B -1/2

C -15/28

D -28/15

Sol : ½ = (10p -15p -9p)/15;

½ = (10p -24p) /15

15/2 = -14p

P = -15/28

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14) If .16x +.24 = .04x + .96 then what is the value of x ? (easy cal)

A 4

B 6

C 7

D 8

Sol : .16x +.24 = .04x + .96

16x +24 = 4x +96

12x = 72; x = 6

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15) If 2 – 2x/3 ≤ -x/2 + 3 then what is the range of x? (medium no cal)

A x ≤ -6

B X ≥ -6

C x ≥ 5

D x ≤ 5

Sol : 2 – 2x/3 ≤ -x/2 + 3 ; -1 ≤ (4x -3x) /6; -1 ≤ x/6 ; x ≥ -6

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16) If 2 ≤ 4x-2 ≤14 how many integer solutions satisfy the inequality? (medium cal)

A 1

B 2

C 3

D 4

Sol : 2 ≤ 4x-2 ≤14 ; 4≤ 4x ≤ 16; 1 ≤ x≤ 4;

X = 1,2,3,4

17) If $x < 0$ and $x^2 > x$ then which of the following must be true? (hard cal)

A $x > 1$

B $x < 2$

C $x > 2$

D $x < -2$

Sol : $x^2 > x$; $x(x-1) > 0$; $x-1 < 0$ since $x < 0$; $x < 1$

=> $x < 2$ for every value $x < 1$

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18) If $r < 0$ and $pq/r > 1$ which of the following must be true? (medium no cal)

A $pq > r$

B $pq < r$

C $p > r/q$

D $p < r/q$

Sol : since $r < 0$,multiplying r both sides the sign changes, $pq < r$

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19) If $|x - 3| = 5$ and $x < 2$ which of the following is the value of x? (medium no cal)

A -2

B 8

C {-2,8}

D no real solution exists

Sol : $x - 3 = 5$ or $x - 3 = -5$;

$X = 8$ or $x = -2$ since $x < 2$, $x = -2$

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20) If $|x - 2| < -3$ then what are the solutions of the given equation? (easy no cal)

A $x < -1$

B $x > 5$

C no real solutions

D the entire real line

Sol : since mod is always positive, no real real solutions exist.

Interpreting linear functions

21) In a math objective test, each correct answer increases the marks by .5. the overall marks (M) in the exam is given by the equation below. What is the no 20 in the equation ? (medium no cal)

$$M = 20 + .5n$$

A Total marks got by the candidate in the math exam

B the number of marks got by the candidate if he attempts all the questions wrong

C the number of questions right

D the average marks

Sol : 20 is the y intercept which is the minimum number of marks a student gets.

22) Bronze is an alloy which consists of copper and tin. Copper costs 15$ per kg and tin cost 10$ per kg. 5 kg of cooper consists of x kg of cooper and y kg of tin. If $15x + 10y = 150$, What is the cost per kg of bronze material. (medium cal)

A 30

B 40

C 50

D 60

Sol : total cost of x kg of cooper and y kg of tin = $15x + 10y = 150$

Total cost per kg = $150/5 = 30$

23) A sales executive in a car dealer earns his income which has a base salary and a commission calculated by the number of cars sold (n). If the salary is given by the following equation . What is his basic salary? (easy no cal)

S = 50000 + 1000n

A 1000

B 40000

C 50000

D 60000

Sol : the basic salary is 50000 from the equation S = 50000 + 1000n when n=0

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24) A sales executive in a car dealer earns his income which has a base salary and a commission which is calculated by the number of cars sold (n). the salary is given by the following equation .

S = 50000 + 1000n

If the total salary the executive draws in a particular month is 62000, How many cars did he sold that month? (medium , no cal)

A 2

B 8

C 10

D 12

Sol: 62000 = 50000 + 1000n;

1000n = 12000; n = 12

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25) A sales executive in a car dealer earns his income which has a base salary and a commission which is calculated by the number of cars sold (n). the salary is given by the following equation .

$$S = 50000 + 1000n$$

What is his commission per car sold? (easy no cal)

A 500
B 1000
C 2000
D 5000
Sol: the commission per car sold is 1000 per car from the equation S = 50000 + 1000n

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26) Ravi participates in a duathlon which consists of running and cycling event. During the event ravi runs for r miles and cycles for c miles and his total oxygen in kg required during the whole event is given by the following equation. How many kg of oxygen is required per mile during running?

$$T = .8\,r + .9\,c$$ (medium no cal)

A .9
B .8
C .4
D .45
Sol: ravi requires .8 kg of oxygen per mile of running and .9 kg of oxygen per mile of cycling

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27) A company bus has to drop all its employees , the number of passengers at any given stop(p) in the bus is given by the following equation.

$$f(p) = 3\,(30 - p)$$

At what stop the bus finished dropping all the employees. ? (easy no cal)

A 15
B 20
C 25
D 30
Sol: when f(p) = 0 the bus would have dropped all its employees. It happens at p = 30

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28) The per capita personal income of the people of United States during 2000 to 2005 is given by the equation below. Y = 950t +20000, where $10 \leq t \leq 15$. Where t = 10 corresponds to the year 2000. How much per capita income is increased from the beginning of 2002 to end of 2004?

(medium cal)

A 950

B 1900

C 2850

D 5000

Sol : each year per capita increases by 950 , so during two year per capita increases by 950 x 2 = 1900

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29) The annual sales S (in millions of dollars) of a xyz cooperation during 2000 to 2006 can be approximated by the linear equation below.

S = 4.5t -25 where ($10 \leq t \leq 16$)

where t = 10 corresponds to the year 2000. Using the model equation estimate the year where the annual sales of company xyz is 29 million dollars? (medium cal)

A 2006

B 2004

C 2002

D 2000

Sol : put s = 29 in the equation S = 4.5t -25.

We get t = 12 and hence the year 2002

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30) During 1950 to 1975 , the federal minimum hourly wage is modeled by the equation

W(t) = .15t + .75 (where $0 \leq t \leq 25$) where t = 0 corresponds to the year 1950 and t = 1 corresponds to year 1951 etc. what is the minimum hourly wage during the year 1965.

(medium cal)

A .75

B 1.5

C 2

D 3

Sol : during 1965 t = 15 . substitute t = 15 in W(t) = .15t + .75, we get W(t) = 3

Linear equation word problems

31) If we subtract 5 from three times a certain number the result is twice the same number. What is that number? (easy no cal)

A 2

B 3

C 5

D 10

Sol : 3x – 5 = 2x ; x = 5

32) During a dance performance, it takes 3 min for each dancer to perform. After all the dancers finish their performances, the judges give their critical views and prize distribution follows which takes 15 min. If the total time which took for the event was 1 and a half hours, how many dancers performed during the event? (medium cal)

A 15

B 20

C 25

D 30

Sol : 3x + 15 = 90

X = 25

33) In a town , the rents for the two bedroom flat decreases linearly as we move away from the center of the town . If the maximum rent is 1000 $ and the rent decreases by 50 $ per mile, how many miles is the house away from the center of town if the rent is 750$? (easy cal)

A 2

B 3

C 4

D 5

Sol 1000 – x 50 = 750

X = 250/50 = 5

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34) In a movie theater, the seats are arranged in rectangular shape. If 165 people are watching the movie and there are 13 people in each row , how many complete rows are filled in the theater hall? (medium cal)

A 11

B 12

C 13

D 14

Sol : 13 x 12 + 9 = 165 ..so there are 12 rows totally.

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35) In a game called" mechanically operated bull ride" , if the person is able to sit on the bull for around 60 seconds , he is doing decent and scores 120. During the first 60 seconds the participant gains 2 points per second and and after 60 seconds the participant gains 4 points per second. Which of the following best describes the expression for the number of points if the participant spends x seconds (x >60)? (medium no cal)

A (x-60)*2

B 120 + (x-60)*2

C (x-60)*4

D 120 + (x-60)*4

Sol : for the first 60 seconds the points are 120 . rest of x – 60 seconds the points are 4(x-60).

Total points are 120 + (x-60)*4

36) John has given his bike for service and his bill came to a total of 133 $. If john was billed for 75 $ for the spare parts and 13$ for the tax and 9 $ per hour for labor, then how many hours did the technician serviced johns bike? (medium cal)

A 4

B 5

C 6

D 7

Sol : 133 = 75 + 13 + 9x

X = 45/9 = 5 hours

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37) The sum of consecutive positive integers is 13 more than the difference between the greatest and the least number, then what is the greatest number ? (hard cal)

A 3

B 4

C 5

D 6

Sol: (a + a+1 + a +2) = 13 + (a+2-a)

3a +3 = 15

a = 4

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38) For the 4 consecutive even integers, The sum of the first 2 consecutive even integers is 22 . what is the sum of last two consecutive even integers. (medium cal)

A 26

B 28

C 30

D 32

Sol : 2n + 2n+2 = 22

n = 5

2n+4 + 2n+6 = 30

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39) If the sum of three consecutive odd integers is 51 then what is the value of the middle integer?
(medium cal)

A 7

B 11

C17

D 19

Sol : 2n+1 + 2n+3 + 2n+5 = 51

6n+ 9 = 51

n =7

2n + 3 = 17

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40) three times the larger number is 30 more than twice the smaller number and the difference between larger number and smaller number is 5. What is the value of the bigger number?
(medium cal)

A 10

B 15

C 20

D 25

Sol : 3a = 30 + 2b

a-b = 5

solving a = 20 and b = 15

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41) Initially there are p dollars in the savings account during the first month. If one fourth of the amount present every end of the month is removed for four months and 5000 is added to the savings account at the end of fourth month then how many dollars are in the saving account in the beginning of the fifth month in terms of p? (assume there are no other transactions)
(hard cal)

A 5000 + ((3/4)^4)P

B 5000 + ((1/4)^4)P

C ((3/4)^4)P

D ((1/4)^4)P

Sol : in the end of first month ¾ p is left

in the end of second month $(¾)^2$ p is left

in the beginning of the fifth month 5000 + ((3/4)^4)P is left

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42) On Monday there are p chairs in the class room and on Tuesday morning 8 more chairs are added and on Wednesday morning the number of chairs are tripled. How many chairs are their in the classroom on Wednesday evening in terms of p? (medium cal)

A 3 (p + 8)

B 2 (p+8)

C (p+8)

D 3(p-8)

Sol : on Tuesday (p + 8) chairs are there and on Wednesday 3 (p+8) chairs are there.

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43) Let there be x number of one dollar coins in the jar. In the coming days, if 12 one dollar coins are added and the number of one dollar coins is doubled then how many one dollar coins are in terms of x? (easy no cal)

A 2 (x + 12)

B (x+ 12)

C 3(X-12)

D 2(x-12)

Sol : x => x +12 => 2 (x+12)

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44) Last year 2015, p engineering students are there in total in an engineering college. next year,20% of the students will graduate and 230 fresh number of students are added to the college. How many students are present this year in terms of p? (medium cal)

A (.2 * p)

B (.8 * p)

C (.2 * p) + 230

D (.8 * p) + 230

Sol : if 20 percent graduate, then .8 P remain and 230 are added to .8p=> .8p +230

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45) Paul is paid a total of 10500 $ during a particular month including 500 $ bonus at the end of that month. If paul is paid equally every week in that month and assume there are 4 weeks in that month, then how much is paul paid per week in the month? (medium cal)

A 2800
B 2700
C 2600
D 2500
Sol : 4x + 500 = 10500
X = 2500

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46) In the last over of a one day cricket match, Sachin hit x fours and y sixes . which of the following represents the total number of runs scored in the last over? (simple no cal)

A 4x + 6y
B 6x + 4y
C 4(x+y)
D 6(x+y)

Sol for x fours 4x runs are made and for y sixes 6y runs are made. So totally 4x + 6y runs are made.

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47) Susan's salary is x $ per month and she gives y dollars to her parents every month. How many dollars did susan gave her parents in z months? (medium no cal)

A x (y- z)
B z (x – y)
C y (x – z)
D z (y-x)
Sol : every month susan gives (x –y) $ to her parents
In z months susan gives z (x – y) $

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48) Rahul's salary is x $ per month and he spends s $ per month , in m months how many dollars does Rahul save? (easy no cal)

A m (s-x)

B s (m- x)

C m(x- s)

D x (m-s)

Sol : every month rahul saves (x – s) $, so in m months Rahul saves m (x-s)

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49) The number of students in class A which has x students is three times the number of students in class B which has y students .If class A has 30 students then which of the following equations is true? (easy No cal)

A 90 = 30y

B 30 + y = 90

C 30 = 3+y

D 30 = 3y

Sol : if class A has 30 students, then x = 3y => 30 = 3y

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50) Eric has x dimes and y nickels. Which of the following expressions represents the total amount of money in dollars Eric has? (1 dime = .1 $ and 1 nickel = .05 $) (easy cal)

A .1x + .05y

B .05x + .1y

C .1(x+ y)

D .05(x+ y)

Sol: x dimes amounts to .1x $ and y nickels amounts to .05y $.

Total = .1x + .05y

Linear inequality word problems
