



Dr. Bbosa Science

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Algebra is a branch of mathematics dealing with symbols and the rules for manipulating those symbols. In elementary algebra, those symbols (today written as Latin and Greek letters) represent quantities without fixed values, known as variables. Just as sentences describe relationships between specific words, in algebra, equations describe relationships between variables.

### Example 1

Solve:  $y + 3 = -2y$

Collect like terms

$$y + 2y = 3$$

$$3y = 3$$

Divide by 3 throughout

$$y = 1$$

### Example 2

Simplify :  $\frac{36a^2b}{9ab^2}$

Solution

$$\frac{\overset{4}{\cancel{36}}\overset{2}{\cancel{a^2}}b}{\cancel{9}a\overset{2}{\cancel{b^2}}} = \frac{4a}{b}$$

### Example 3

The sum of two numbers is 2. If one of the numbers is  $\frac{2}{3}$ , what is the other number?

Let one number be x

$$x + \frac{2}{3} = 2$$

$$x = 2 - \frac{2}{3} = 1\frac{1}{3}$$

## Revision questions

1. Akiiki is 38 years old and his son is 12 years old. At what age will Akiiki be twice as old as his son?
2. (a) Solve:  $\frac{12}{x} + 2 = 6$ .
3. Solve  $\frac{x}{2} - 1 = 0$
4. Simplify  $2b + 4a - 2a + b$ .
5. If  $\frac{12}{n} = \frac{3}{4}$ , what is the value of n?
6. A pencil and an exercise book cost shs 400. An exercise book costs three times as much as the pencil. What is the cost of the pencil?
7. Solve:  $2x + 5 = x + 1$
8. Solve:  $3(p-4) - 2(3p-1) = 2p-15$ .
9. Solve  $\frac{y}{2} - 3 = 5$
10. Mary is x years old. She is twice as old as peter. Express Peter's age in terms of Mary's age.
11. What should be added to  $(2x + 2)$  to get  $(3x - 3)$ ?
12. (a) Simplify  $\frac{32 \times 1.2}{0.016}$   
(b) Solve:  $\frac{1}{2}(3x - 2) = \frac{2}{3}(2x + 3)$
13. (a) By forming an equation, find 3 consecutive numbers which add up to 135.  
(b) The mother of Apio is 23 years old and Apio is 4 years old.
14. (i) In how many years will the mother be twice as old as APio?  
(ii) How old will Apio's mother be then?
15. If  $a = -1$  and  $b = 3$ , find the value of  $\frac{a^2b}{b}$
16. If  $\frac{1}{8} = \frac{2}{t}$ , find the value of t.
17. Solve  $3x = 9$
18. Simplify:  $(3x - 2) - (2x + 2)$ .
19. (a)  $2x + \frac{2}{5}y = 12$ . Given that  $y = \frac{1}{2}$ . Find the value of x.  
(b) If x are positive integers, find the set of values, which satisfies the inequality:  $2x + 4 \leq 10$ .

20. Tom has three daughters: Amanda, Brenda and Kate. Brenda is 2 years younger than Amanda.

Kate's age is  $\frac{1}{2}$  that of Brenda. The total age of the three girls is 27 yrs. How old is Kate?

21. Subtract  $2x - 4$  from  $5x - 4$ .

22. Solve  $3p - 6 = 18 + p$

23. (a) Given that  $a = \frac{1}{2}$ ;  $b = \frac{1}{3}$ ;  $c = \frac{1}{4}$

Find the value of  $b + 2c + 3a$

(b) Solve:  $\frac{3x}{4} + \frac{1}{3} = \frac{7}{12}$

24. Solve  $2x + 2 = 6$

25. If  $a = -3$  and  $b = 4$ , find the value of  $a^2 + b^2$

26. Simplify:  $\frac{1}{3}(6x - 3m)$

27. If  $\frac{3}{5} = \frac{6}{x}$  find the value of  $x$ .

28. (a) Find the value of  $x$  if

$$4(3x - 5) - 2(6 + x) = -12$$

(b) Solve the inequality:  $3x - 6 < 10 + x$

29. What is  $x$  if:  $7 + x = 11$ ?

30. If  $P = r$ ,  $r = 4$  and  $q = 3$ , work out:  $\frac{pq}{r}$

31. Simplify:  $2(7 - a) - (8 - a)$

32. Simplify:  $3m - (2 + m)$

33. Solve  $2p - 8 = 16$

34. If  $\frac{1}{6}x = 1\frac{1}{6}$ , find the value of  $x$ .

35. (a) Kirya is 3 times as old as his daughter. The difference between their ages is 36 years. How old is the daughter.

b) Solve  $2(3a - 5) - 3(1 - a) = 14$

36. simplify  $(3x + 5) - (x + 1)$ .

37. Give the solution set of the inequality:  $1 < X < 7$
38. Solve;  $a + 7 = 13$
39. Simplify:  $(8m + 9) - (3m + 4)$ .
40. Given that  $a = 1$ , and  $b = 3$ , find the value of  $3a - 3b$ .
41. Solve for  $x$  in  $2x - 5 = x - 1$ .
42. Annet is 20 years younger than Peter. In 15 years, Peter will be twice as old as Annet. How old is Annet now?
43. If  $\frac{2}{5}$  of a number is 10. Find the number.
44. Solve  $5y - 4 = 16$
45. Given that  $a = 2$ ,  $b = 4$  and  $c = -3$ . Work out:  $b(a + c)$ .
46. (a) Solve  $x - 1 = 2x + 5$ .
- (b) Solve the inequality;  $3(2 - x) < 15$ .
47. Solve;  $m - 3 = 3$
48. If  $a = 2$ ,  $b = 3$  and  $c = 5$ , find the value of  $3a + b + c$ .
49. (a) Solve for  $x$ :  $\frac{2x+2}{3} = \frac{x+3}{2}$
- (b) What is the value of  $\frac{bc-d}{c^2}$ ; when  $b = 8$ ,  $c = 3$  and  $d = 6$ ?
50. Solve the equation;  $\frac{1}{2}p + 1 = 3$
51. Find the value of  $\frac{5a-(m-a)}{a}$ , when  $a = 3$  and  $m = 6$ .
52. (a) Solve the inequality:  $\frac{3}{4}x - 8 > 1$
- (b) Solve for  $P$   $3 - (p - 1) = 2(p + 5)$
53. Solve:  $2x + 7 = 11$ .
54. Given that  $a = 6$ ,  $b = 3$ ,  $c = 2$  and  $d = 1$ . Work out  $\frac{ad}{bc}$
55. Three pupils are aged  $(2x + 5)$ ,  $(3x - 10)$  and  $(x + 3)$  years. Their total age is 34 years.
- (a) Find the value of  $x$  (3 marks)
- (b) How old is the youngest pupils? (2 marks)

56. Simplify:  $6x - 5m + 3m - 4x$

57. Workout:  $t^6 \div t^2$

58. solve  $3 - X = 2X$

59. Given that  $x=3$ ,  $y=4$  and  $z=6$ , find the value of  $\frac{xy}{z}$

60. Solve the inequality:  $1 + \frac{1}{2}x > 2$ .

61. (a) solve:  $\frac{1}{2}m + 7 = 2m - 2$

(03 arks)

(b) Solve  $\frac{10}{n} + 4 = 24$

(03 marks)

62. Simplify  $4k - 3k + k$

63. Solve the equation  $5t - 2(t + 1) = 1$

64. Solve the inequality  $-2p + 4 > 6$

65. Solve  $3x - (x + 3) = 3$

66. Solve for X:  $3 + 4 = X$  (finite 5)

67. a) Solve for x:  $2(x+1) - 3(2x-1) = -3$

(03 marks)

b) Find the value of  $a^r \div a^x$ . given that  $a=2, r=5$  and  $x=3$

(03 marks)

68. Simplify  $2x + 3x = 5x$

69. Given that  $a=3$  and  $b=4$ , find the value of  $2a + 2b$

70. (a) solve  $2m + 3 = 18 - m$  (3marks)

(b). Solve:  $2(3x-1) - 4(x-1) = 4$

(3marks)

71. Simplify

(a)  $n^2 \times n = n^3$

(1mark)

(b)  $m^6 \div m^3 = m^{(6-3)} = m^3$

(1mark)

(c)  $\frac{a^2 \times a^5}{a^3} = \frac{a^{2+5}}{a^3} = a^{7-3} = a^4$

(2marks)

72. Given that  $p = -4$ ,  $q = 3$  and  $c = -2$ , find the value of  $\frac{Pq}{c}$
73. Solve  $2(3x - 6) = 24$
74. (a) solve  $6x - 9(x - 2) = 3$  (3 marks)  
 (b) Solve:  $3 + 4m > 12 + 3m$  (3 mark)
75. Solve:  $\frac{2}{3}m = 4$
76. Given that  $k = 2$  and  $p = -3$ , find the value  $3k + 2p$
77. (a) Solve:  $14p + 4 = 11$  (2marks)  
 (b). Solve the inequality:  $3x + 4 > x + 8$ . (02marks)
78. Simplify:  $4t - 2k + 5k - t$
79. (a) Solve the inequality:  $9 \leq -3(y - 1)$ . (03 marks)  
 b) State the first two values of the solution set for the inequality? (01 marks)
80. Simplify:  $5ab - 2xy - ab + 7xy$ .
81. Given that  $n = 3$  and  $r = -2$ , evaluate  $\frac{2n+r}{r}$
82. Simplify:  $18x - 5(3x + 7)$ .
83. Given that  $a = -2$ ,  $b = 3$  and  $c = 4$ , find the value of  $b(a^2 + c)$ .
84. Solve the equation:  $7n + 2 = 23$
85. Given that  $a = 3$  and  $b = -2$ , find the value of  $a^2 - b^3$ .
86. (a) Solve the equation:  $\frac{3}{5}n + 6 = 2 + n$  (03marks)  
 (b) Solve the inequality:  $9 - 2k > k + 3$  (02 marks)
87. Simplify  $3a + a - 2a = 2a$
88. Simplify:  $5k - 2(3 - k)$
89. (a) Given that  $m = 3k$  and  $k = 5$ , find the value of  $2k + 6m$  (03 marks)  
 (b) Write the solution set for inequality  $6 < x < 10$  (01mark)

## Suggested answers

1. Akiiki is 38 years old and his son is 12 years old. At what age will Akiiki be twice as old as his son?

Let the number of years that pass be  $x$

Akiiki's age after  $x$  years will be  $38 + x$

The son's age after  $x$  years will be  $12 + x$

It implies that after  $x$  years;  $\frac{38+x}{12+x} = 2$

$$38 + x = 2(12 + x)$$

$$38 + x = 24 + 2x$$

Collecting like terms to one side

$$x = 14$$

The age of Akiiki will be  $38 + 14 = 52$  years

2. (a) Solve:  $\frac{12}{x} + 2 = 6$ .

$$\frac{12}{x} = 6 - 2 = 4$$

$$12 = 4x$$

$$x = 3$$

3. Solve  $\frac{x}{2} - 1 = 0$

Multiply by 2 both sides

$$x - 2 = 0$$

Add 2 to both sides

$$x = 2$$

4. Simplify  $2b + 4a - 2a + b$ .

Collect like terms

$$2b + b + 4a - 2a = 3b + 2a$$

5. If  $\frac{12}{n} = \frac{3}{4}$ , what is the value of n?

Cross multiplying

$$\frac{12}{n} = \frac{3}{4}$$

$$3n = 12 \times 4$$

$$n = \frac{12 \times 4}{3} = 16$$

6. A pencil and an exercise book cost shs 400. An exercise book costs three times as much as the pencil. What is the cost of the pencil?

Let the cost of pencil be x

The cost of a book = 3x

It implies that  $3x + x = 400$

$$4x = 400$$

Divide by 4 either sides;  $x = 100$

$\therefore$  the cost of a pencil = shs 100

7. Solve:  $2x + 5 = x + 1$

Collect like terms

$$2x - x = 1 - 5$$

$$x = -4$$



8. Solve:  $3(p-4)-2(3p-1) = 2p-15$ .

$$3(p-4) - 2(3p-1) = 2p-15$$

$$3p - 12 - 6p + 2 = 2p - 15$$

$$-12 + 2 + 3p = 2p - 15$$

$$-10 + 15 = 2p + 3p$$

$$5 = 5p$$

$$P = 5/5$$

$$P = 1$$

9. 10. Solve  $\frac{y}{2} - 3 = 5$

$$\frac{y}{2} = 5 + 3 = 8$$

$$y = 8 \times 2 = 16$$

10. . Mary is  $x$  years old. She is twice as old as peter. Express Peter's age in terms of Mary's age.

$$\text{Peter's age} = \frac{x}{2}$$

11. What should be added to  $(2x + 2)$  to get  $(3x - 3)$ ?

Let the number be  $y$

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

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

$$y = 3x - 3 - 2x - 2$$

$$y = 3x - 2x - 3 - 2$$

$$= x - 5$$

12. (a) Simplify  $\frac{32 \times 1.2}{0.016}$

$$\frac{32 \times 1.2}{0.016} = \frac{32}{10} \times \frac{12}{10} \div \frac{16}{1000} = \frac{32}{10} \times \frac{12}{10} \times \frac{1000}{16} = 24$$

(b) Solve:  $\frac{1}{2}(3x - 2) = \frac{2}{3}(2x + 3)$

Multiply by 6 both sides

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

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

$$9x - 6 = 8x + 12$$

Collecting like terms

$$9x - 8x = 12 + 6$$

$$x = 18$$

13. (a) By forming an equation, find 3 consecutive numbers which add up to 135.

Let the numbers be  $x$ ,  $x + 1$ , and  $x + 2$

$$x + (x + 1) + (x + 2) = 135$$

$$3x + 3 = 135$$

$$3x = 132$$

$$x = 44$$

Therefore, the consecutive numbers are 44, 45 and 46

(b) The mother of Apio is 23 years old and Apio is 4 years old.

Let the years be  $x$

$$(23 + x) = 2(4 + x)$$

$$23 + x = 8 + 2x$$

Collecting like terms

$$x = 15$$

thus, the mother will be twice as old as Apio after 15 years

(c) How old will Apio's mother be then?

$$\text{Apio's mother will be } 23 + 15 = 38 \text{ years}$$

14. . If  $a = -1$  and  $b = 3$ , find the value of  $\frac{a^2b}{b}$

Substitution

$$\frac{a^2b}{b} = \frac{-1^2 \times 3}{3} = 1$$

15. If  $\frac{1}{8} = \frac{2}{t}$ , find the value of  $t$ .

By cross multiplying

$$1 \times t = 2 \times 8$$

$$t = 16$$

16. Solve  $3x = 9$

$$\frac{3x}{3} = \frac{9}{3}$$

$$x = 3$$

17. Simplify:  $(3x - 2) - (2x + 2)$ .

$$(3x - 2) - (2x + 2)$$

$$= 3x - 2 - 2x - 2$$

$$= x - 4$$

18.  $2x + \frac{2}{5}y = 12$ . Given that  $y = \frac{1}{2}$ . Find the value of  $x$ .

Substitution

$$2x + \frac{2}{5} \times \frac{1}{2} = 12$$

$$2x + \frac{1}{5} = 12$$

$$2x = 12 - \frac{1}{5}$$

$$x = 5\frac{9}{10}$$

(b) If  $x$  are positive integers, find the set of values, which satisfies the inequality:  $2x + 4 \leq 10$ .

$$2x + 4 \leq 10$$

$$2x \leq 6$$

$$x \leq 3$$

19. Tom has three daughters: Amanda, Brenda and Kate. Brenda is 2 years younger than Amanda.

Kate's age is  $\frac{1}{2}$  that of Brenda. The total age of the three girls is 27 yrs. How old is Kate?

Let Brenda's age be  $x$

	Brenda	Amanda	Kate
Age	$x$	$x + 2$	$\frac{1}{2}x$

Total age 27

$$x + x + 2 + \frac{x}{2} = 27$$

$$x = 10$$

$$\text{Kate's age} = \frac{10}{2} = 5 \text{ years}$$

20. Subtract  $2x - 4$  from  $5x - 4$ .

$$(5x - 4) - (2x - 4)$$

Remove brackets

$$= 5x - 4 - 2x + 4$$

$$= 5x - 2x - 4 + 4$$

$$= 3x$$

21. Solve  $3p - 6 = 18 + p$

$$3p - 6 = 18 + p$$

Collect like terms

$$3p - p = 18 + 6$$

$$2p = 24$$

$$p = 12$$

22. (a) Given that  $a = \frac{1}{2}$ ;  $b = \frac{1}{3}$ ;  $c = \frac{1}{4}$

Find the value of  $b + 2c + 3a$

$$\text{Substitution: } \frac{1}{3} + 2 \times \frac{1}{4} + 3 \times \frac{1}{2} = \frac{4+2 \times 3+3 \times 6}{12} = \frac{28}{12} = \frac{7}{3} = 2\frac{1}{3}$$

(b) Solve:  $\frac{3x}{4} + \frac{1}{3} = \frac{7}{12}$

Multiply by 12 both sides

$$3x \times 3 + 4 = 7$$

$$9x = 3$$

$$x = \frac{1}{3}$$

23. Solve  $2x+2 = 6$

Collecting like terms

$$2x = 6-2 = 4$$

Dividing by 2 throughout

$$X = 2$$

24. If  $a = -3$  and  $b = 4$ , find the value of  $a^2 + b^2$

Substitute for a and b

$$= (-3)^2 + 4^2$$

$$= 9 + 16 = 25$$

25. Simplify:  $\frac{1}{3}(6x-3m)$

$$\frac{1}{3}(6x-3m) = (2x - m)$$

26. If  $\frac{3}{5} = \frac{6}{x}$  find the value of x.

$$\frac{3}{5} = \frac{6}{x}$$

By cross multiplication

$$3x = 30$$

Divide by 3 throughout,  $x = 10$

27. (a) Find the value of  $x$  if

$$4(3x - 5) - 2(6 + x) = -12$$

Open brackets

$$12x - 20 - 12 - 2x = -12$$

Collect like terms

$$10x - 32 = -12$$

$$10x = 20$$

$$x = 2$$

(b) Solve the inequality:  $3x - 6 < 10 + x$

Collecting like terms

$$3x - x < 10 + 6$$

$$2x < 16$$

$$x < 8$$

28. What is  $x$  if:  $7 + x = 11$ ?

$$7 + x = 11$$

Collect like terms

$$x = 11 - 7 = 4$$

29. If  $P = r$ ,  $r = 4$  and  $q = 3$ , work out:  $\frac{pq}{r}$

$$\frac{pq}{r} = \frac{4 \times 3}{4} = 3$$

30. Simplify:  $2(7-a)-(8-a)$

Remove brackets

$$14 - 2a - 8 + a$$

Collect like terms

$$6 - a$$

31. Simplify:  $3m-(2 + m)$

Removing brackets

$$3m - 2 - m$$

Collect like terms

$$2m - 2 = 2(m + 1)$$

32. Solve  $2p-8 = 16$

Collect like terms

$$2p = 16 + 8 = 24$$

Divide by 2 throughout

$$p = 12$$

33. If  $\frac{1}{6}x = 1\frac{1}{6}$ , find the value of x.

$$\frac{1}{6}x = 1\frac{1}{6} = \frac{7}{6}$$

By comparison

$$x = 7$$

34. (a) Kirya is 3 times as old as his daughter. The difference between their ages is 36 years. How old is the daughter.

Let the age of the daughter be  $x$

Age of Kirya =  $3x$

But  $3x - x = 36$

$$2x = 36$$

$$x = 18$$

$\therefore$  daughter's age = 18 year

b) Solve  $2(3a-5)-3(1-a)=14$

Remove brackets

$$6a - 10 - 3 + 3a = 14$$

Collect like terms

$$9a = 27$$

$$a = 3$$

35. Simplify  $(3x + 5) - (x + 1)$ .

Remove brackets

$$3x + 5 - x - 1$$

Collect like terms

$$2x + 4$$

36. Give the solution set of the inequality:  $1 < X < 7$

$$X = \{2, 3, 4, 5, 6\}$$

37. Solve;  $a + 7 = 13$

Collect like terms

$$A = 13 - 7 = 6$$

38. Simplify:  $(8m + 9) - (3m + 4)$ .



$$(8m + 9) - (3m + 4).$$

Remove brackets

$$8m + 9 - 3m - 4$$

Collect like terms

$$5m + 5 = 5(m+1)$$

39. Given that  $a = 1$ , and  $b = 3$ , find the value of  $3a - 3b$ .

Substitute for  $a$  and  $b$

$$(3 \times 1) - (3 \times 3) = 3 - 9 = 3 + 9 = 12$$

40. Solve for  $x$  in  $2x - 5 = x - 1$ .

Collect like terms

$$2x - x = 5 - 1$$

$$x = 4$$

41. Annet is 20 years younger than Peter. In 15 years, Peter will be twice as old as Annet. How old is Annet now?

Let Annet's age be  $X$

Peter's age =  $(X + 20)$

$$\Rightarrow 2(X + 15) = (X + 20) + 15$$

Removing brackets

$$2X + 30 = X + 20 + 15$$

$$X = 5$$

$\therefore$  Annet's age = 5 years

42. If  $\frac{2}{5}$  of a number is 10. Find the number.

Let the number be  $X$

$$\frac{2}{5} \text{ of } x = 10$$

$$\frac{2}{5} x = 10$$

$$x = 10 \times \frac{5}{2} = 25$$

43. Solve  $5y-4=16$

Collect like terms

$$5y = 16 + 4 = 20$$

Divide by 5 on either side

$$\frac{5y}{5} = \frac{20}{5}$$

$$Y = 4$$

44. Given that  $a = 2$ ,  $b = 4$  and  $c = -3$ . work out:  $b(a+c)$ .

Substituting for a, b and c

$$4(2-3) = 4 \times -1 = -4$$

(a) Solve  $x-1=2x+5$ .

Collecting like terms

$$3x = 6$$

Dividing by 3 throughout

$$x = 2$$

(b) Solve the inequality;  $3(2-x) < 15$ .

$$3(2-x) < 15$$

Remove brackets

$$6 - 3x < 15$$

Collect like term

$$X > -3$$

45. Solve;  $m-3 = 3$

$$m = 6$$

46. If  $a = 2$ ,  $b = 3$  and  $c = 5$ , find the value of  $3a + b + c$ .

Substitute for  $a, b, c$

$$(3 \times 2) + 3 + 5 = 14$$

47. Solve for  $x$ :  $\frac{2x+2}{3} = \frac{x+3}{2}$

Multiplying through by 6

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

$$4x + 4 = 3x + 6$$

Collecting like term

$$x = 2$$

(b) What is the value of  $\frac{bc-d}{c^2}$ ; when  $b = 8$ ,  $c = 3$  and  $d = 6$ ?

$$\text{Substituting} = \frac{8 \times 3 - 6}{3^2} = \frac{24 - 6}{3 \times 3} = \frac{18}{9} = 2$$

48. Solve the equation;  $\frac{1}{2}p + 1 = 3$

$$\frac{1}{2}p + 1 = 3$$

$$\Rightarrow \frac{1}{2}P = 2$$

$$P = 4$$

49. Find the value of  $\frac{5a-(m-a)}{a}$ , when  $a = 3$  and  $m = 6$ .

Substitution

$$\frac{5 \times 3 - (6 - 3)}{3} = \frac{15 - 3}{3} = \frac{12}{3} = 4$$

50. (a) Solve the inequality:  $\frac{3}{4}x - 8 > 4$

Multiply by 4 throughout

$$3x - 32 > 4$$

Collecting like terms

$$3x > 36$$

Divide by 3 throughout

$$x > 12$$

b) Solve for P  $3 - (p - 1) = 2(p + 5)$

$$3 - (p - 1) = 2p + 10$$

$$3 - p + 1 = 2p + 10$$

$$3p = -6$$

$$p = -2$$

51. Solve:  $2x + 7 = 11$ .

Collect like terms

$$2x = 11 - 7$$

$$= 4$$

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

$$x = 2$$

52. Given that  $a = -6$ ,  $b = 3$ ,  $c = -2$  and  $d = 1$ . Work out  $\frac{ad}{bc}$

$$\text{Substitute for a, b, c, d: } = \frac{-6 \times 1}{-2 \times 3} = 1$$

53. Three pupils are aged  $(2x + 5)$ ,  $(3x - 10)$  and  $(x + 3)$  years. Their total age is 34 years.

(a) Find the value of  $x$  (3 marks)

The sum of their years = 34

$$(2x + 5) + (3x - 10) + (x + 3) = 34$$

$$(6x - 2) = 34$$

$$6x = 36$$

$$X = 6$$

(b) How old is the youngest pupils?

(2 marks)

By substitution

$$(2x + 5) = 2 \times 6 + 5 = 17 \text{ years}$$

$$(3x - 10) = 3 \times 6 - 10 = 8 \text{ years}$$

$$(x+3) = 6 + 3 = 9 \text{ years}$$

$\therefore$  the youngest is 8 years

54. Simplify:  $6x - 5m + 3m - 4x$

Collect like terms

$$= 6x - 4x + 3m - 5m$$

$$= 2x - 2m$$

55. Workout:  $t^6 \div t^2$

$$= t^{(6-2)} = t^4$$

56. solve  $3 - X = 2X$

$$3 = 2x + x = 3x$$

$$X = 1$$

57. Given that  $x=3$ ,  $y=4$  and  $z=6$ , find the value of  $\frac{xy}{z}$

$$\text{Substitute for } x, y \text{ and } z = \frac{3 \times 4}{6} = \frac{12}{6} = 2$$

58. Solve the inequality:  $1 + \frac{1}{2}x > 2$ .

$$\frac{1}{2}x > 2 - 1$$

$$x > 1 \times 2$$

$$x > 2$$

59. (a) solve:  $\frac{1}{2}m + 7 = 2m - 2$

(04 arks)

multiply by 2 throughout

$$m + 14 = 4m - 4$$

Collect like terms

$$3m = 18$$

$$m = 6$$

(b) Solve  $\frac{10}{n} + 4 = 24$

(03 marks)

Multiply by n

$$10 + 4n = 24n$$

Collect like terms

$$20n = 10$$

$$\frac{20n}{20} = \frac{10}{20} = \frac{1}{2}$$

$$n = \frac{1}{2}$$

60. Simplify  $4k - 3k + k$

$$4k + k - 3k = 5k - 3k = 2k$$

61. Solve the equation  $5t - 2(t + 1) = 1$

Remove brackets:  $5t - 2t - 2 = 1$

Collect like terms:  $5t - 2t = 1 + 2$

Simplify  $3t = 3$

$$t = 1$$

62. Solve the inequality  $-2p + 4 > 6$

Collect like terms  $-2p > 6 - 4 = 2$

Divide through 2 :  $-p > 1$

Multiply through by -1 (the sign changes)  $p < -1$

63. Solve  $3x - (x + 3) = 3$

$$3x - x - 3 = 3$$

$$2x = 6$$

$$x = \frac{6}{2} = 3$$

64. Solve for X:  $3 + 4 = X$  (finite 5)

$$3 + 4 = 7$$

$$7 \div 5 = 1r2$$

$$X = 2$$

65. 33.a) Solve for x:  $2(x+1) - 3(2x-1) = -3$

(03 marks)

$$= 2x + 2 - 6x + 3 = -3$$

$$= -4x = -3 - 5 = -8$$

$$x = 2$$

b) Find the value of  $a^r \div a^x$ , given that  $a=2, r=5$  and  $x=3$

(03 marks)

$$2^5 \div 2^3 = 2^{(5-3)} = 2^2 = 2 \times 2 = 4$$

66. Simplify  $2x+3x + 5x = 10x$

67. Given that  $a= -3$  and  $b=4$ , find the value of  $2a+2b$

$$\text{Substitute: } 2 \times -3 + 2 \times 4$$

$$= -6 + 8$$

$$= 2$$

68. (a) solve  $2m+3=18-m$  (3marks)

Collect like term to one side

$$2m + m = 18-3$$

$$3m = 15$$

$$m = 5$$

(b). Solve:  $2(3x-1) -4(x-1) =4$

(3marks)

$$6x -2 -4x +4 =4$$

$$2x = 2$$

$$x = 1$$

69. Simplify

(a)  $n^2 \times n = n^3$

(1mark)

(b)  $m^6 \div m^3 = m^{(6-3)} = m^3$

(1mark)

(c)  $\frac{a^2 \times a^5}{a^3} = \frac{a^{2+5}}{a^3} = a^{7-3} = a^4$

(2marks)

70. Given that  $p= -4$ ,  $q = 3$  and  $c = -2$ , find the value of  $\frac{P q}{c}$

$$\text{Substitute and evaluate} = \frac{-4 \times 3}{-2}$$

$$= +6$$

71. Solve  $2(3x - 6) = 24$

$$= 6x - 12 = 24$$

$$6x = 36$$

$$x = 6$$

72. . (a) solve  $6x - 9(x - 2) = 3$

(3 marks)

$$6x - 9x + 18 = 3$$

$$-3x = -15$$

$$x = 5$$

73. Solve:  $3 + 4m > 12 + 3m$

(3 mark)

Collecting like term

$$M > 9$$

74. Solve:  $\frac{2}{3}m = 4$

$$\frac{2}{3}m = 4$$

Multiply by  $\frac{3}{2}$  on either side

$$\frac{3}{2} \times \frac{2}{3}m = \frac{3}{2} \times 4 ;$$

$$m = 6$$

75. Given that  $k = 2$  and  $p = -3$ , find the value  $3k + 2p$

Substitute for  $k$  and  $p$

$$3 \times 2 + 2 \times -3 = 0$$

76. (a) Solve:  $14p + 4 = 11$  (2marks)

$$14p + 4 = 11$$

$$14p = 11 - 4 = 7$$

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



(b). Solve the inequality:  $3x + 4 > x + 8$ .

(02marks)

$$3x + 4 > x + 8$$

Collect like terms

$$3x - x > 8 - 4$$

$$2x > 4$$

$$x > 2$$

77. Simplify:  $4t - 2k + 5k - t$

Collect like terms:  $4t - t + 5k - 2k = 3t + 3k$

78. (a) Solve the inequality:  $9 \leq -3(y - 1)$ .

(03 marks)

$$9 \leq -3(y - 1)$$

$$9 \leq -3y + 3$$

$$9 - 3 \leq -3y + 3 - 3$$

$$6 \leq -3y$$

$$-2 \leq y$$

b) State the first two values of the solution set for the inequality?

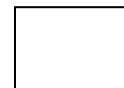
(01 marks)

-1, 0

79. Simplify:  $5ab - 2xy - ab + 7xy$ .

**Collect like terms**

$$(5ab - ab) + (-2xy + 7xy) = 4ab + 5xy$$



80. Given that  $n = 3$  and  $r = -2$ , evaluate  $\frac{2n+r}{r}$

Substitute the expression

$$\frac{2n+r}{r} = \frac{(2 \times 3) + -2}{-2} = \frac{6-2}{-2} = \frac{4}{-2} = -2$$

81. Simplify:  $18x-5(3x+7)$ .

$$18x-5(3x+7)$$

$$18x- 15x-35$$

$$3x -35$$

82. Given that  $a=-2$ ,  $b=3$  and  $c=4$ , find the value of  $b(a^2+ c)$ .

Substitute for a, b and c

$$b(a^2 + c) = 3(-2^2 + 4)$$

Evaluate

$$3(-2^2 + 4) = 3(4+4) = 24$$

83. Solve the equation:  $7n + 2 = 23$

$$7n + 2 = 23$$

Subtract 2 from either side

$$7n = 23-2 =21$$

Divide by 7 on both sides

$$\frac{7n}{7} = \frac{21}{7}$$

$$n = 3$$

84. Given that  $a = 3$  and  $b = -2$ , find the value of  $a^2 -b^3$ .

Substitute for a and b

$$3^2 -(-2)^3 = 9 - (-8)$$

$$= 9 + 8$$

$$= 17$$

85. (a) Solve the equation:  $\frac{3}{5}n + 6 = 2 + n$  (03marks)

Multiply by 5 throughout to remove a fraction

$$5\left\{\frac{3}{5}n + 6 = 2 + n\right\}$$

$$= 3n + 30 = 10 + 5n$$

Collect like terms  $= (30 - 10) = (5n - 3n)$

$$= 20 = 2n$$

$$n = 10$$

(b) Solve the inequality:  $9 - 2k > k + 3$  (02 marks)

$$9 - 2k > k + 3$$

Collect like terms:  $9 - 3 > k + 2k$

$$6 > 3k$$

Divide by 3 throughout:  $2 > k$

86. Simplify  $3a + a - 2a = 2a$

87. Simplify:  $5k - 2(3 - k)$

$$= 5k - 6 + 2k$$

$$= 7k - 6$$

88. (a) Given that  $m = 3k$  and  $k = 5$ , find the value of  $2k + 6m$  (03 marks)

$$2k + 6m = 2k + 6(3k)$$

$$= 2k + 18k$$

$$= 20k$$

$$= 20 \times 5$$

$$= 100$$

(d) Write the solution set for inequality  $6 < x < 10$  (01mark)

{7, 8, 9}