St. Ninian's High School

Maths Department

Fourth Level
Programme Two

Revision Pack

Common Factor

1. $x^2 + 4x$

2. $x^2 - 6x$

3. $x^2 + 9x$

4. $x^2 - 10x$

5. $7x - x^2$

6. $12x + x^2$

7. $2x - x^2$

8. $15x - x^2$

9. $a^2 - 5a$

10. $c^2 + 8c$

11. $g^2 - 14g$

12. $11p - p^2$

13. $2x^2 - 4x$

14. $5x^2 + 10x$

15. $3n^2 - 9n$

16. $2g^2 + 8g$

17. $5n^2 - 15n$

18. $4d + 6d^2$

19. $8n + 12n^2$

20. $3f + 15f^2$

21. $7a^2 - 14a$

22. $2w - 12w^2$

23. $7c + 21c^2$

24. $5u^2 - 20u$

25. $6x^2 - 9x$

26. $4y - 14y^2$

27. $10n^2 + 15n$

28. $5p^2 - 35p$

29. $8m - 12m^2$

30. $10h + 12h^2$

Difference of two squares

1. $x^2 - 4$

2. $x^2 - 9$

3. $x^2 - 25$

4. $x^2 - 100$

5. $64 - x^2$

6. $49 - x^2$

7. $1 - x^2$

8. $36 - x^2$

9. $a^2 - 16$

10. $c^2 - 81$

11. $2g^2 - 18$

12. $4p^2 - 36$

13. $2x^2 - 50$

14. $5x^2 - 5$

15. $3n^2 - 75$

16. $2g^2 - 200$

17. $12 - 3n^2$

18. $18 - 2p^2$

19. $8 - 8u^2$

20. $x^2 - y^2$

21. $p^2 - q^2$

22. $4p^2 - 49$

23. $16 - 25c^2$

24. $36 - 81w^2$

25. $4x^2 - 9y^2$

26. $9p^2 - 16q^2$

27. $25m^2 - 81n^2$

28. $2p^2 - 8q^2$

29. $6x^2 - 6y^2$

30. $45m^2 - 5n^2$

31. $3c^2 - 27d^2$

32. $6h^2 - 24k^2$

33. $10a^2 - 40c^2$

34. $63u^2 - 7v^2$

35. $5x^2 - 80y^2$

Fractional Factorisation

1. Express these fractions in their simplest form:

   (a) $\dfrac{3}{6}$ (b) $\dfrac{8}{12}$ (c) $\dfrac{30}{16}$ (d) $\dfrac{54}{72}$

   (e) $\dfrac{10a}{5}$ (f) $\dfrac{9b}{6}$ (g) $\dfrac{18}{12x}$ (h) $\dfrac{25}{15y}$

   (i) $\dfrac{4c}{16c^2}$ (j) $\dfrac{32a}{8a^3}$ (k) $\dfrac{13p^2}{52p^3}$ (l) $\dfrac{36ab}{6bc}$

   (m) $\dfrac{4a}{2a^2}$ (n) $\dfrac{10x^2}{12xy}$ (o) $\dfrac{3v^2t}{9vt^2}$ (p) $\dfrac{10ab^3}{2a^2b}$

   (q) $\dfrac{30p^2q}{25pq^2}$ (r) $\dfrac{81x^2y^2}{6y^2}$ (s) $\dfrac{42mn^2}{56mn}$ (t) $\dfrac{8def^2}{10e^2f}$

   (u) $\dfrac{3ab^2c}{4a^2c}$ (v) $\dfrac{4k^2m}{28km^2}$ (w) $\dfrac{5efg^2}{10e^2fg^3}$ (x) $\dfrac{21xy^2}{36x^3}$

2. Simplify by first finding the common factor:

   (a) $\dfrac{3a+6b}{6}$ (b) $\dfrac{4x+12y}{2}$ (c) $\dfrac{3a+a^2}{ab}$ (d) $\dfrac{xy+y^2}{2y}$

   (e) $\dfrac{xy+x^2}{6x+xy}$ (f) $\dfrac{3ab+6b^2}{9b^2}$ (g) $\dfrac{25b^2+15b^3}{10b}$ (h) $\dfrac{14p+10q}{2s}$

   (i) $\dfrac{3a}{2ab-ac}$ (j) $\dfrac{6x}{9x+9y}$ (k) $\dfrac{2st}{6rs-2st}$ (l) $\dfrac{5c}{10ac+15bc}$

   (m) $\dfrac{14p+28p^2}{8+16p}$ (n) $\dfrac{8c+4d}{6ac+3ad}$ (o) $\dfrac{8n^2-2n}{12n-3}$ (p) $\dfrac{15x^2+6xy}{10x+4y}$

3. Simplify the following by first factorising the numerator and/or denominator:

   (a) $\dfrac{b^2-4}{b+2}$ (b) $\dfrac{x^2-81}{x-9}$ (c) $\dfrac{a^2-25}{a+5}$ (d) $\dfrac{y^2-36}{y+6}$

   (e) $\dfrac{c^2-49}{2c-14}$ (f) $\dfrac{a^2-64}{2a+16}$ (g) $\dfrac{p^2-1}{5p-5}$ (h) $\dfrac{q^2-9}{3q+9}$

   (i) $\dfrac{a^2-b^2}{3a+3b}$ (j) $\dfrac{x^2-y^2}{5x-5y}$ (k) $\dfrac{2m^2-18}{2m+6}$ (l) $\dfrac{3d^2-48}{12d-48}$

Fraction Operations

Q46)

1   $\frac{3}{5} \times \frac{1}{4}$ 29 $\frac{1}{2} \times \frac{3}{4} \times 1\frac{1}{2}$

5   $\frac{2}{5} \times \frac{1}{3}$ 17 $1\frac{1}{2} \times \frac{1}{4}$ 32 $4\frac{1}{2} \times 2\frac{1}{4} \times \frac{3}{5}$

9   $\frac{2}{7} \times \frac{1}{5}$ 21 $\frac{1}{4} \times 1\frac{2}{3}$ 35 $6\frac{1}{3} \times \frac{1}{3} \times 1\frac{1}{4}$

13   $\frac{3}{4} \times \frac{5}{7}$ 25 $1\frac{2}{3} \times 1\frac{1}{3}$ 38 $5\frac{1}{3} \times 6\frac{1}{9} \times \frac{6}{11}$

                                      41   $\frac{1}{2} \times \frac{3}{4} \times \frac{5}{8}$

Q48)

1   $\frac{1}{2} \times \frac{4}{5}$

5   $\frac{6}{5} \times \frac{1}{3}$ 25 $\frac{1}{9} \times 1\frac{1}{2}$

9   $\frac{6}{7} \times \frac{5}{12}$ 17 $\frac{3}{7} \times \frac{14}{9}$ 29 $2\frac{1}{7} \times 1\frac{2}{5}$

13   $\frac{3}{7} \times \frac{21}{10}$ 21 $\frac{9}{27} \times \frac{8}{4}$ 33 $\frac{3}{8} \times 1\frac{7}{9} \times 1\frac{1}{2}$

Q49)

Work the following.

a $\frac{2}{3} \times 12$ b $\frac{5}{6} \times 24$ c $28 \times \frac{2}{7}$ d $20 \times \frac{5}{8}$

e $\frac{7}{10} \times 25$ f $\frac{4}{9} \times 15$ g $36 \times \frac{3}{8}$ h $\frac{1}{2} \times \frac{3}{5} \times 40$

i $\frac{3}{5} \times \frac{3}{4} \times 50$ j $\frac{2}{3} \times \frac{7}{8} \times 60$ k $\frac{3}{8} \times \frac{4}{5} \times 25$ l $\frac{4}{9} \times \frac{3}{8} \times 45$

Q50)   Find the reciprocals of the following fractions and mixed numbers:

1. $2\frac{5}{12}$ _____   2. $\frac{37}{74}$ _____   3. $\frac{17}{41}$ _____

4. $3\frac{4}{13}$ _____   5. $\frac{12}{19}$ _____   6. 62 _____

7. $\frac{7}{55}$ _____   8. $\frac{5}{36}$ _____   9. $\frac{8}{9}$ _____

Q51)

1   $\frac{1}{4} \div 2$

5   $\frac{2}{3} \div 3$ 17 $1\frac{1}{2} \div 2$

9   $\frac{3}{7} \div 2$ 21 $2\frac{2}{3} \div 5$

13   $\frac{7}{10} \div 3$ 25 $4\frac{2}{3} \div 5$

Q52)

29 $\frac{4}{5} \div 2$

33 $\frac{9}{11} \div 3$

37 $\frac{5}{6} \div 20$

41 $\frac{8}{11} \div 10$

45 $4\frac{1}{2} \div 6$

49 $1\frac{1}{3} \div 8$

53 $1\frac{1}{5} \div 9$

57 $12\frac{1}{2} \div 5$

61 $3\frac{1}{2} \div 2$

65 $19\frac{1}{2} \div 15$

Q53)

1 $\frac{2}{5} \div \frac{1}{2}$

5 $\frac{1}{2} \div \frac{2}{3}$

9 $1\frac{1}{2} \div 1\frac{3}{5}$

13 $3\frac{1}{3} \div 3\frac{1}{2}$

17 $1\frac{1}{2} \div \frac{1}{3}$

21 $5\frac{1}{2} \div 1\frac{1}{3}$

25 $\frac{3}{10} \div \frac{1}{2}$

29 $\frac{3}{8} \div \frac{1}{4}$

33 $3\frac{1}{3} \div 7\frac{1}{2}$

37 $4\frac{4}{5} \div 5\frac{1}{3}$

41 $\dfrac{2\frac{2}{3}}{2\frac{2}{5}}$

46 $\dfrac{2\frac{1}{4}}{1\frac{7}{8}}$

Q54)

$\left(\frac{4}{7}\right)^2$ $\left(\frac{2}{8}\right)^2$ $\left(4\frac{1}{5}\right)^2$

$\left(\frac{3}{5}\right)^3$ $\left(\frac{2}{4}\right)^3$ $\left(3\frac{1}{3}\right)^2$

$\sqrt{\frac{9}{25}}$ $\sqrt{\frac{9}{36}}$ $\sqrt{1\frac{7}{9}}$

$\sqrt[3]{\frac{27}{125}}$ $\sqrt[3]{\frac{8}{64}}$ $\sqrt[3]{-\frac{27}{125}}$

Q55)

1. $\left(-\frac{2}{5}\right)^2$ 2. $\left(-\frac{4}{7}\right)^2$

3. $\left(-\frac{3}{5}\right)^3$ 4. $\left(-\frac{5}{8}\right)^3$

5. $-\left(\frac{4}{5}\right)^2$ 6. $-\left(\frac{5}{6}\right)^2$

7. $\left(-3\frac{2}{3}\right)^2$ 8. $\left(-5\frac{1}{4}\right)^2$

9. $\left(-1\frac{1}{3}\right)^3$ 10. $\left(-2\frac{1}{2}\right)^3$

Q56)

1) $\dfrac{7}{5} \div \left(5 + \dfrac{3}{2}\right)$

2) $1 + \dfrac{3}{2} \div \dfrac{6}{5}$

3) $\left(\dfrac{8}{5} + \dfrac{1}{5}\right) \div 2$

4) $\dfrac{5}{3} \times \dfrac{5}{3} \times 2$

5) $\left(6 - \dfrac{3}{2}\right) \times \dfrac{5}{3}$

6) $\left(\dfrac{2}{3} \times 5\right) \div \dfrac{1}{2}$

7) $\dfrac{3}{4}\left(4 + \dfrac{1}{2}\right)$

8) $2 \times \dfrac{2}{3} \times 2$

9) $\left(2 + \dfrac{7}{6}\right) \times \dfrac{3}{2}$

10) $1\dfrac{1}{3} + 6 + 1\dfrac{1}{6}$

11) $3\dfrac{5}{6} \times 1\dfrac{5}{6} - 1\dfrac{5}{6}$

12) $2\dfrac{1}{5} - 1\dfrac{3}{4} + 2$

Q57)

$\frac{3}{8} - (\frac{1}{2} - \frac{3}{8}) =$

$(\frac{1}{3} + 1) \times \frac{1}{2} \div \frac{7}{7} =$

$\frac{1}{6} + \frac{1}{2} \times (2 - \frac{2}{3}) =$

$2 - \frac{1}{4} + \frac{1}{2} \times \frac{1}{4} =$

$4 \times (\frac{1}{2} + \frac{2}{8} \div \frac{1}{2}) =$

$(\frac{4}{2} - \frac{1}{2}) + 1) \times \frac{1}{2} =$

$\frac{1}{3} \times (7 - 1) =$

$\frac{4}{6} - (\frac{2}{3} - \frac{1}{6}) =$

$1 \div (1 \div (3 \times \frac{1}{2})) =$

$(1 - \frac{1}{5}) \times \frac{1}{4} =$

$1 - (\frac{1}{2} + 2 \times \frac{1}{8}) =$

$3 - (\frac{1}{5} + 1 \div \frac{1}{2}) =$

Q58) The . in the following means multiply

a. $2\frac{1}{3} - 1\frac{1}{2} \cdot 3\frac{1}{3}$

b. $\left(2\frac{1}{3} - 1\frac{1}{2}\right) \cdot 3\frac{1}{3}$

c. $\left(3\frac{1}{4} - 1\frac{2}{3}\right) \cdot \left(5\frac{1}{3} - 2\frac{1}{2}\right)$

d. $\left(2\frac{3}{4}\right)^2 - \left(3\frac{1}{2}\right)^2$

Q59)   Evaluate the following when a) $x = \frac{1}{2}$,   b) $x = \frac{4}{5}$,   c) $x = 2\frac{2}{3}$

(i)   x – 3   (ii)   -6x   (iii)   6(x – 3)   (iv)   7x – x²

Basic Circle

Q60) a)   Find the circumference of each circle
b)   Find the circumference of each circle in terms of π
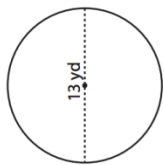
1)

13 yd

Circumference =_____

2)

3 ft

Circumference =_____

3)

20 in

Circumference =_____

4)

17 ft

Circumference =_____

5)

15 in

Circumference =_____
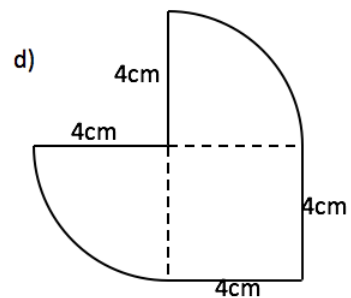
6)

7 yd
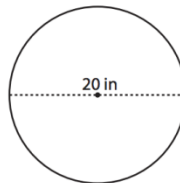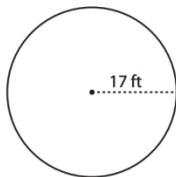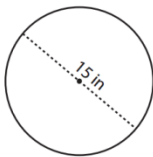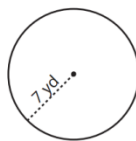
Circumference =_____

Q61)

2. Find the **perimeter** of these shapes made from fractions of circles.

a)
10cm

b)
6cm

c)
5cm

d)
8cm

e)
2cm

f)
12cm

g)
5.5cm

h)
2.5cm
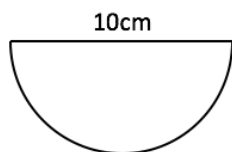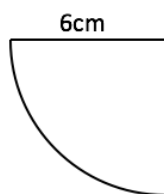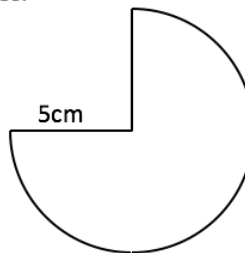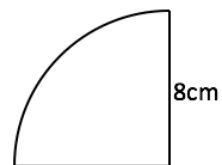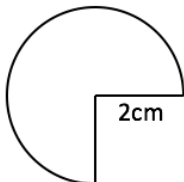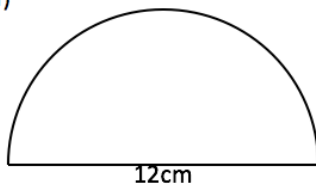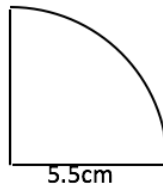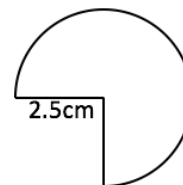
Q62)

Work out the **perimeter** of these shapes made from circles and rectangles.

a)

2cm

6cm

b)

1cm

5cm

c)

5cm

6cm

d)

4cm

4cm

4cm

4cm
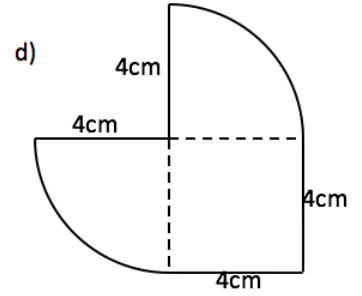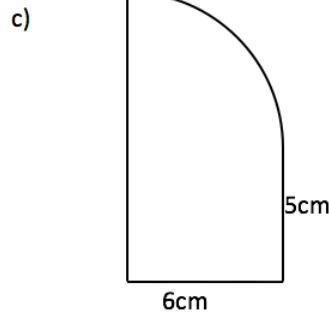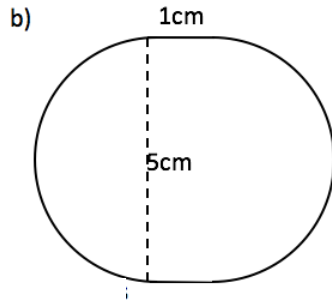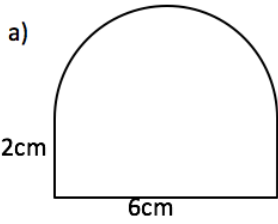
Q63)
a)   A length of cotton is wrapped round a reel 100 times. If the reel has a radius of 1.5cm, find (i) its circumference, (ii) the length of the cotton
b)   A garden contains a circular pond with a diameter of 3.5 metres. Calculate (i) the circumference of the pond in metres and in centimetres, (ii) if tiles (20cm long) are laid around the edge of the pond, how many will be needed?

Q64)   Find the radius and diameter given the circumference:

Circumference	Radius	Diameter
10π ft		
24π in		
34π yd		
40π in		
16π ft		

Q65) a)   Find the area of each circle
       b)   Find the area of each circle in terms of π

1)

15 ft

Area =

2)

22 in

Area =

3)

9 yd

Area =

4)

12 yd

Area =

5)

3 in.

Area =

6)

34 ft
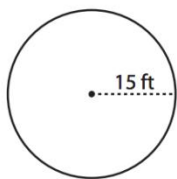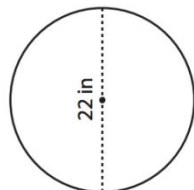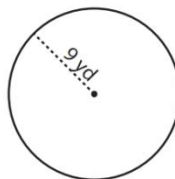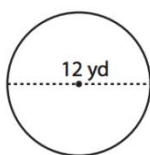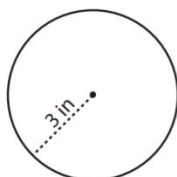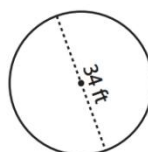
Area =

Q66)

Find the **area** of these shapes made from fractions of circles.

a)

10cm

b)

6cm

c)

5cm

d)

8cm

e)

2cm

f)

12cm

g)

5.5cm

h)

2.5cm
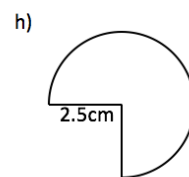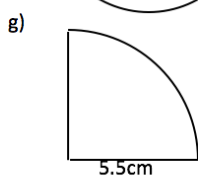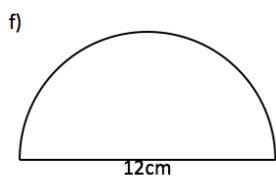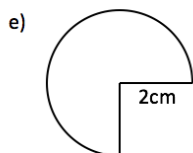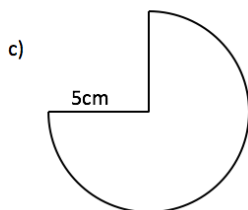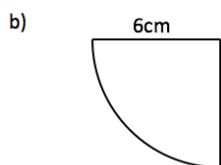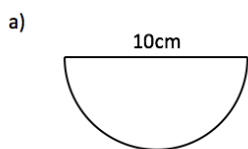
Q67)

Work out the **area** of these shapes made from circles and rectangles.

a)

2cm

6cm

b)

1cm

5cm

c)

6cm

5cm

d)

4cm

4cm

4cm

4cm
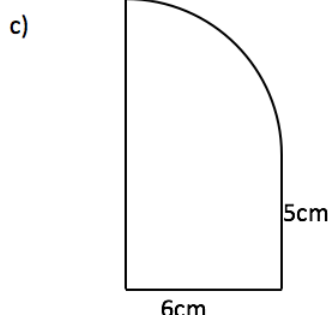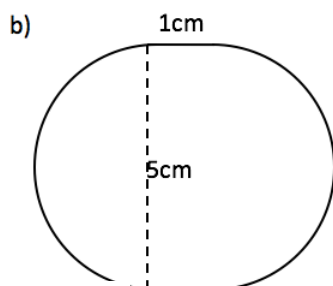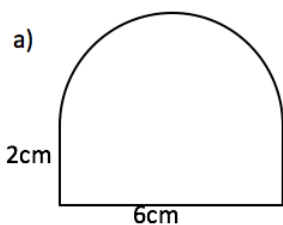
Q68)
Mr. Abbott says that if you buy a 12 inch pizza you get twice as much than if you bought a 6 inch pizza. Is he correct? (explain your answer)

Q69)

A. Find the radius and diameter of each circle.

1)

Area = 100π ft²

Radius = _____

Diameter = _____

2)
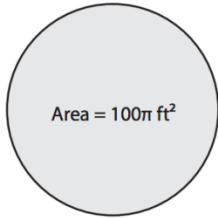
Area = 625π in²

Radius = _____

Diameter = _____

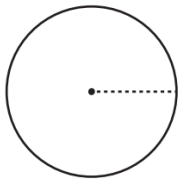**3)**

Area = 49π yd²
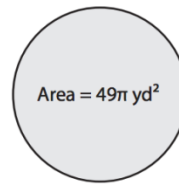
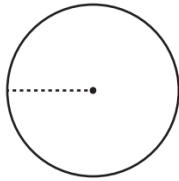Radius = _____

Diameter = _____

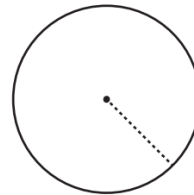## Q70)   Find the area of the following;

1)

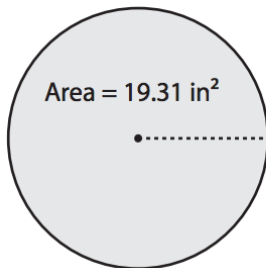Circumference = 77.87 in

2)

Circumference = 111.78 ft

3)

Circumference = 56.08 yd

Q71)   Find the circumference of the following:

1)

Area = 19.31 in²
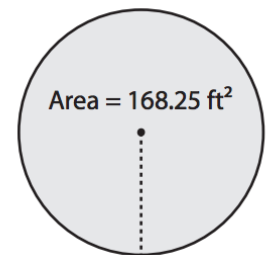
2)

Area = 151.67 yd²

3)

Area = 168.25 ft²
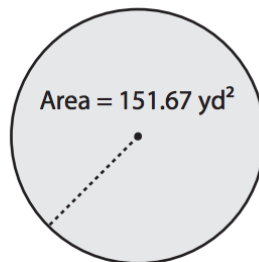
Equations and Inequations

Q95) Solve:

a) $\frac{1}{3}(8x - 3) = 3$
b) $1 + \frac{5}{2}x = 16$
c) $\frac{9x}{2} = 3 + \frac{3x}{4}$

d) $\frac{1}{6}x = \frac{2}{3}(x - 9)$
e) $\frac{3x}{4} + x = \frac{7x}{8} + 2x - 9$
f) $\frac{2}{5}(x + 3) = \frac{7}{2}$

g) $\frac{3}{5} + \frac{2}{3}x = 4$
h) $\frac{2x}{5} = \frac{3}{2} + \frac{1}{4}x$
i) $\frac{2}{7}(3x + 6) = \frac{3}{10}$

j) $\frac{1}{3}(4x - 1) - \frac{1}{4}(3x - 4) = 6 - \frac{1}{2}(x + 2)$
k) $\frac{5x-2}{3} - \frac{x-8}{4} + 2 = \frac{x+14}{2}$

Q96) Write an inequality for:

a)   x is greater than -2   b)   y is less than or equal 9   c)   2 is less than p

Q97) Write down the meaning of these inequalities:

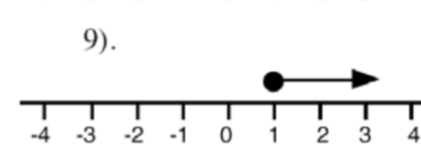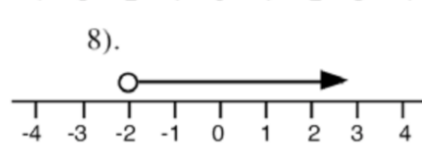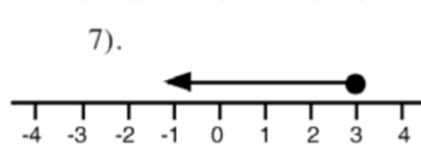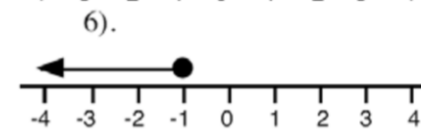1). $x \geq 3$ 2). $x < -1$ 3). $y \geq -2$ 4). $x > 1$ 5). $x \leq 0$
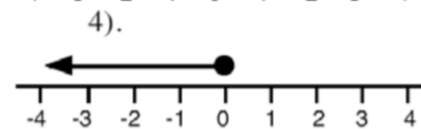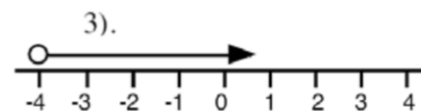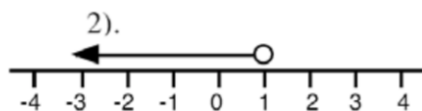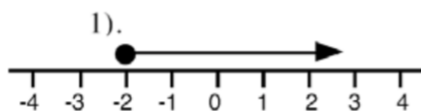6). $x > -6$ 7). $x \leq 4$ 8). $x \geq -5$ 9). $x \leq -2$ 10). $y > 2$

Q98) Write down the inequality represented on the number lines:
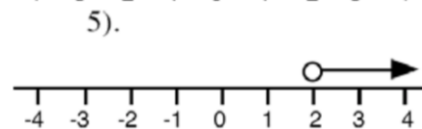
Q99) Write down an inequality for each of the following:
a)   x is greater than 3 but less than 9   b)   m lies between -2 and 2
c)   x is greater than -1 but less than or equal to 0   d)   k is greater than or equal to -6 but less than 5

Q100) Write down the meaning of these inequalities:

1). $1 \leq x \leq 4$ 2). $5 < x < 7$ 3). $3 < x \leq 7$ 4). $0 \leq x < 5$
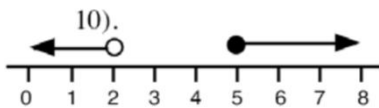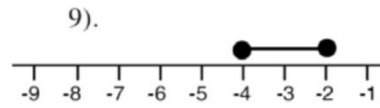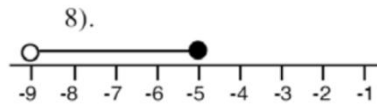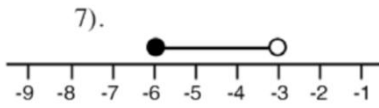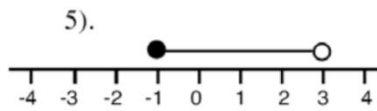5). $6 > x \geq 4$ 6). $8 \geq x \geq 3$ 7). $4 \geq x > 0$ 8). $7 > x \geq 2$
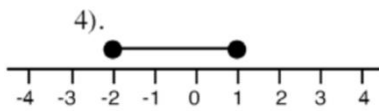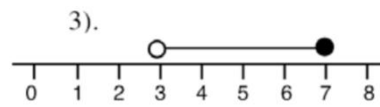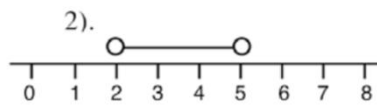9). $-3 \leq x \leq 2$ 10). $-2 \leq x \leq 1$ 11). $-5 < x < -1$ 12). $-6 < x \leq -3$

Q101) Write down the inequality represented on the number line:

1).

2).

3).

4).

5).

6).

7).

8).

9).

10).

11).

12).

Q102) Write down the inequalities for the values of x which satisfy:

a)   x > 11 and x < 15   b)   -8 < x < 2 and x ≤ -2

Q103) List the whole numbers which satisfy $-9 \le y < -5$

Q104) Solve:

a) $y + 9 \ge 15$ b) $-2 + c < -7$ c) $7m > -77$ d) $\frac{x}{2} \le 8$

Q105) Rewrite the following with the variable on the left-hand side:

a) $-9 \ge x$ b) $6 < p$ c) $19 > k$

Q106) Solve:

a) $6 < 2x$ b) $9 \ge -1 + x$ c) $-6.6 \ge 2y$

Q107) Divide the following by -1 and rewrite the resulting inequality:

a)   9 > 5   b)   -6 < -2   c)   2 > -2

Q108) Solve:

a) $-y \ge 5$ b) $9.8 \ge -v$ c) $-c \ge -\frac{2}{3}$

Q109) Solve:

a) $-x + 5 \ge 10$ b) $2.5 < 7 - c$ c) $4x - 1 > -4$

d) $\frac{x}{2} + 5 \le -1$ e) $5x > 3x - 9$ f) $7 - 2x \le 9x + 8$

g) $8 < 4(2x - 1)$ h) $9 - 2(x + 5) < 8$ i) $5(-1 + 3x) > -9(x - 9)$

j) $-\frac{1}{2}x^2 + 4x + 1 \ge -\frac{1}{2}x^2 - x$ k) $\frac{5y}{7} > 3 - \frac{y+2}{5}$