

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) $\frac{3}{6}$	(b) $\frac{8}{12}$	(c) $\frac{30}{16}$	(d) $\frac{54}{72}$
(e) $\frac{10a}{5}$	(f) $\frac{9b}{6}$	(g) $\frac{18}{12x}$	(h) $\frac{25}{15y}$
(i) $\frac{4c}{16c^2}$	(j) $\frac{32a}{8a^3}$	(k) $\frac{13p^2}{52p^3}$	(l) $\frac{36ab}{6bc}$
(m) $\frac{4a}{2a^2}$	(n) $\frac{10x^2}{12xy}$	(o) $\frac{3v^2t}{9vt^2}$	(p) $\frac{10ab^3}{2a^2b}$
(q) $\frac{30p^2q}{25pq^2}$	(r) $\frac{81x^2y^2}{6y^2}$	(s) $\frac{42mn^2}{56mn}$	(t) $\frac{8def^2}{10e^2f}$
(u) $\frac{3ab^2c}{4a^2c}$	(v) $\frac{4k^2m}{28km^2}$	(w) $\frac{5efg^2}{10e^2fg^3}$	(x) $\frac{21xy^2}{36x^3}$

2. Simplify by first finding the common factor:

(a) $\frac{3a + 6b}{6}$	(b) $\frac{4x + 12y}{2}$	(c) $\frac{3a + a^2}{ab}$	(d) $\frac{xy + y^2}{2y}$
(e) $\frac{xy + x^2}{6x + xy}$	(f) $\frac{3ab + 6b^2}{9b^2}$	(g) $\frac{25b^2 + 15b^3}{10b}$	(h) $\frac{14p + 10q}{2s}$
(i) $\frac{3a}{2ab - ac}$	(j) $\frac{6x}{9x + 9y}$	(k) $\frac{2st}{6rs - 2st}$	(l) $\frac{5c}{10ac + 15bc}$
(m) $\frac{14p + 28p^2}{8 + 16p}$	(n) $\frac{8c + 4d}{6ac + 3ad}$	(o) $\frac{8n^2 - 2n}{12n - 3}$	(p) $\frac{15x^2 + 6xy}{10x + 4y}$

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

(a) $\frac{b^2 - 4}{b + 2}$	(b) $\frac{x^2 - 81}{x - 9}$	(c) $\frac{a^2 - 25}{a + 5}$	(d) $\frac{y^2 - 36}{y + 6}$
(e) $\frac{c^2 - 49}{2c - 14}$	(f) $\frac{a^2 - 64}{2a + 16}$	(g) $\frac{p^2 - 1}{5p - 5}$	(h) $\frac{q^2 - 9}{3q + 9}$
(i) $\frac{a^2 - b^2}{3a + 3b}$	(j) $\frac{x^2 - y^2}{5x - 5y}$	(k) $\frac{2m^2 - 18}{2m + 6}$	(l) $\frac{3d^2 - 48}{12d - 48}$

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	$1\frac{1}{2} \times \frac{1}{4}$
9	$\frac{2}{7} \times \frac{1}{5}$	21	$\frac{1}{4} \times 1\frac{2}{3}$
13	$\frac{3}{4} \times \frac{5}{7}$	25	$1\frac{2}{5} \times 1\frac{1}{3}$
		32	$4\frac{1}{2} \times 2\frac{1}{4} \times \frac{3}{5}$
		35	$6\frac{1}{3} \times \frac{1}{3} \times 1\frac{1}{4}$
		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	$\frac{1}{2} \times \frac{4}{5}$	25	$\frac{1}{9} \times 1\frac{1}{2}$
5	$\frac{6}{5} \times \frac{1}{3}$	29	$2\frac{1}{7} \times 1\frac{2}{5}$
9	$\frac{6}{7} \times \frac{5}{12}$	17	$\frac{3}{7} \times \frac{14}{9}$
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	$\frac{1}{4} \div 2$	17	$1\frac{1}{2} \div 2$
5	$\frac{2}{3} \div 3$	21	$2\frac{2}{3} \div 5$
9	$\frac{3}{7} \div 2$	25	$4\frac{2}{3} \div 5$
13	$\frac{7}{10} \div 3$		

Q52)

$$\begin{array}{ll}
 29 & \frac{4}{5} \div 2 \\
 33 & \frac{9}{11} \div 3 \\
 37 & \frac{5}{6} \div 20 \\
 41 & \frac{8}{11} \div 10 \\
 45 & 4\frac{1}{2} \div 6 \\
 49 & 1\frac{1}{3} \div 8 \\
 53 & 1\frac{1}{5} \div 9 \\
 57 & 12\frac{1}{2} \div 5 \\
 61 & 3\frac{1}{2} \div 2 \\
 65 & 19\frac{1}{2} \div 15
 \end{array}$$

Q53)

$$\begin{array}{lll}
 1 & \frac{2}{5} \div \frac{1}{2} & 9 & 1\frac{1}{2} \div 1\frac{3}{5} \\
 5 & \frac{1}{2} \div \frac{2}{3} & 13 & 3\frac{1}{3} \div 3\frac{1}{2} \\
 & & 17 & 1\frac{1}{2} \div \frac{1}{3} \\
 & & 21 & 5\frac{1}{2} \div 1\frac{1}{3} \\
 & & 25 & \frac{3}{10} \div \frac{1}{2} \\
 & & 29 & \frac{3}{8} \div \frac{1}{4}
 \end{array}$$

$$\begin{array}{l}
 33 & 3\frac{1}{3} \div 7\frac{1}{2} \\
 37 & 4\frac{4}{5} \div 5\frac{1}{3} \\
 41 & \frac{2\frac{2}{3}}{2\frac{2}{5}} \\
 46 & \frac{2\frac{1}{4}}{1\frac{7}{8}}
 \end{array}$$

Q54)

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

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

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

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

Q55)

$$\begin{array}{ll}
 1. & \left(-\frac{2}{5}\right)^2 \\
 3. & \left(-\frac{3}{5}\right)^3 \\
 5. & -\left(\frac{4}{5}\right)^2 \\
 7. & \left(-3\frac{2}{3}\right)^2 \\
 9. & \left(-1\frac{1}{3}\right)^3 \\
 2. & \left(-\frac{4}{7}\right)^2 \\
 4. & \left(-\frac{5}{8}\right)^3 \\
 6. & -\left(\frac{5}{6}\right)^2 \\
 8. & \left(-5\frac{1}{4}\right)^2 \\
 10. & \left(-2\frac{1}{2}\right)^3
 \end{array}$$

Q56)

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

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

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

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

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

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

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

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

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

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

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

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

Q57)

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

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

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

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

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

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

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

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

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

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

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

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

Q58) The \bullet in the following means multiply

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

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

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

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) $-6x$

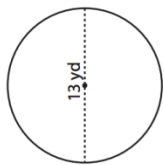
(iii) $6(x - 3)$

(iv) $7x - x^2$

Basic Circle

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

1)



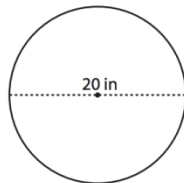
Circumference = _____

2)



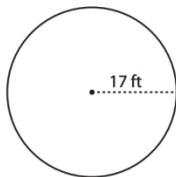
Circumference = _____

3)



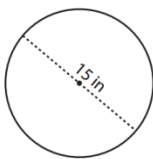
Circumference = _____

4)



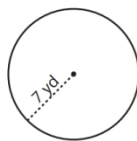
Circumference = _____

5)



Circumference = _____

6)

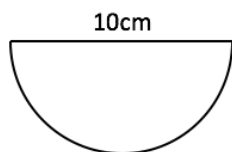


Circumference = _____

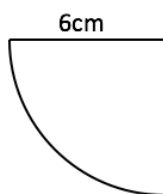
Q61)

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

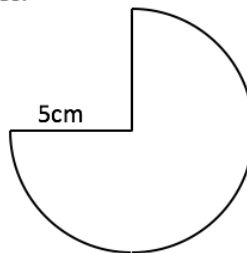
a)



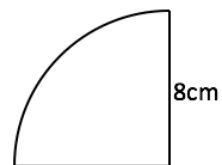
b)



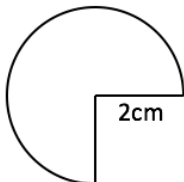
c)



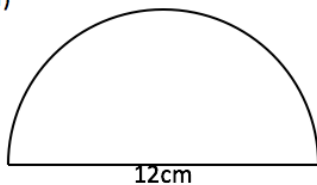
d)



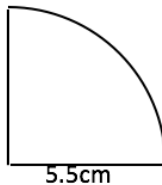
e)



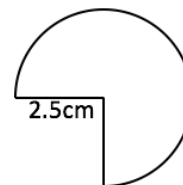
f)



g)

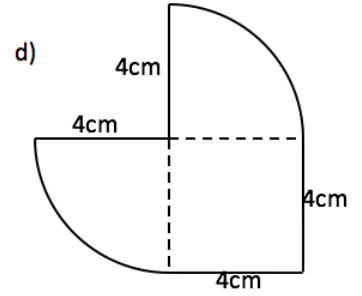
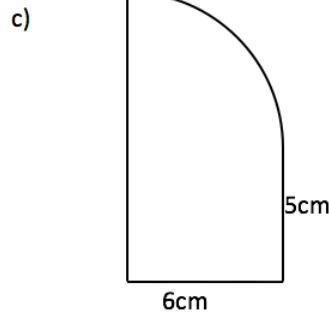
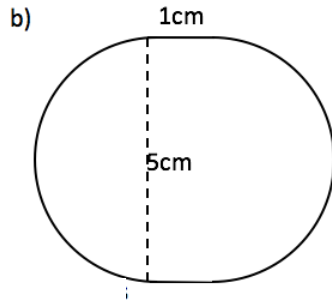
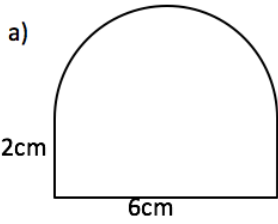


h)



Q62)

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



Q63)

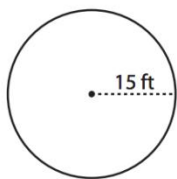
- a) A length of cotton is wrapped round a reel 100 times. If the reel has a radius of 1.5cm, find (i) its circumference, (ii) the length of the cotton
- b) A garden contains a circular pond with a diameter of 3.5 metres. Calculate (i) the circumference of the pond in metres and in centimetres, (ii) 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		

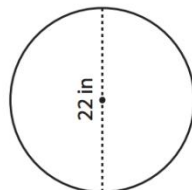
- Q65) a) Find the area of each circle
 b) Find the area of each circle in terms of π

1)



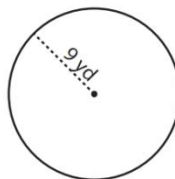
Area =

2)



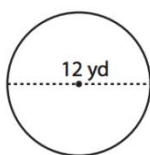
Area =

3)



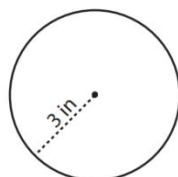
Area =

4)



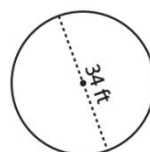
Area =

5)



Area =

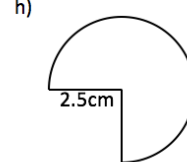
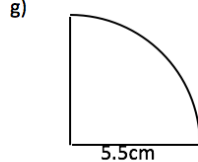
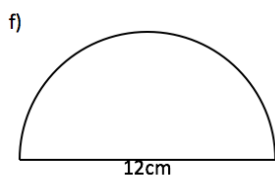
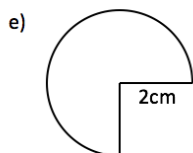
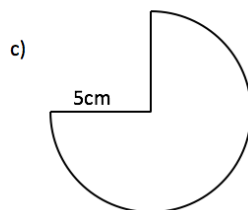
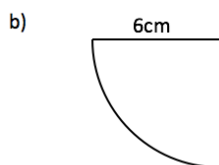
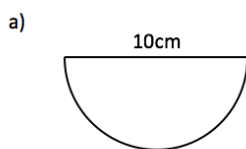
6)



Area =

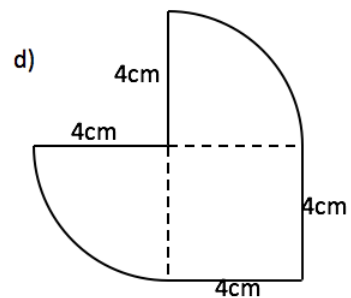
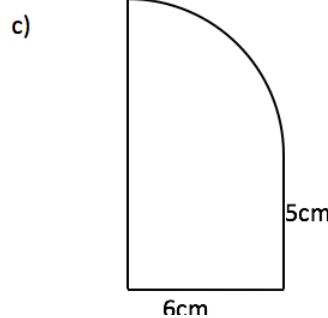
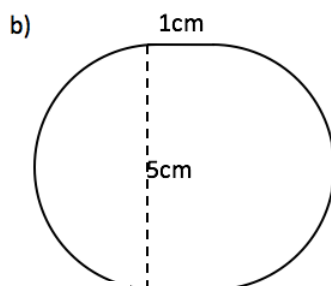
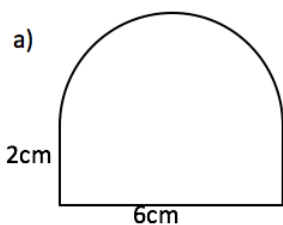
Q66)

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



Q67)

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



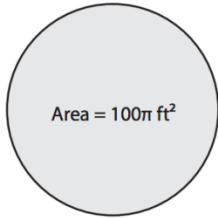
Q68)

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)



Radius = _____

Diameter = _____

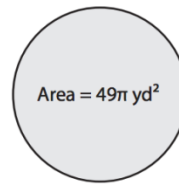
2)



Radius = _____

Diameter = _____

3)

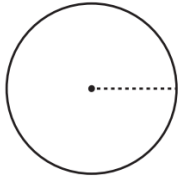


Radius = _____

Diameter = _____

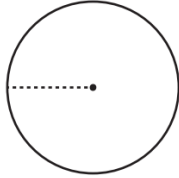
Q70) Find the area of the following;

1)



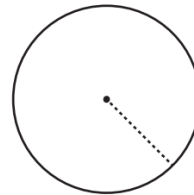
Circumference = 77.87 in

2)



Circumference = 111.78 ft

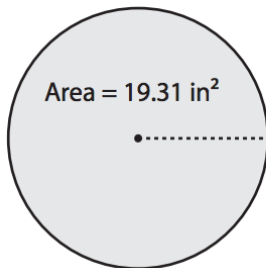
3)



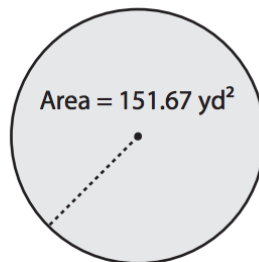
Circumference = 56.08 yd

Q71) Find the circumference of the following:

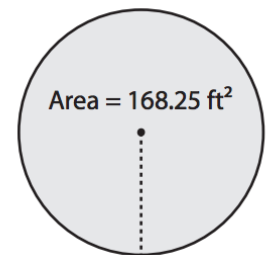
1)



2)



3)



Equations and Inequalities

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). $x > -6$

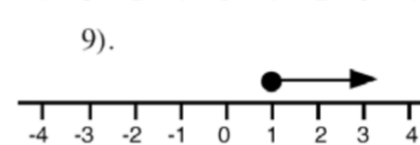
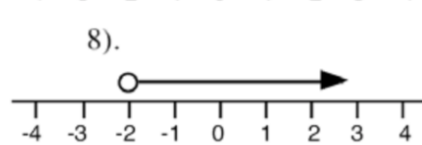
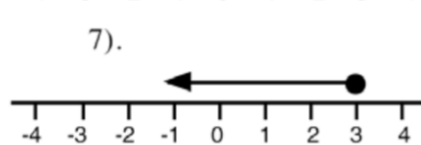
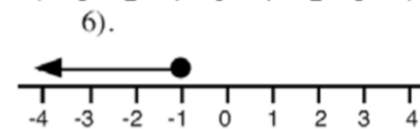
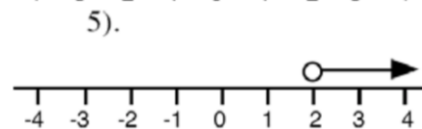
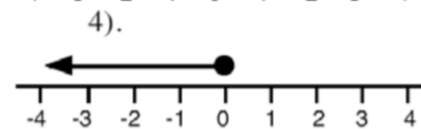
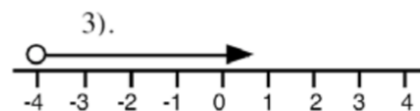
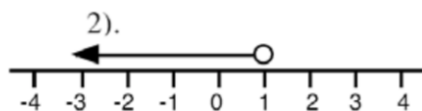
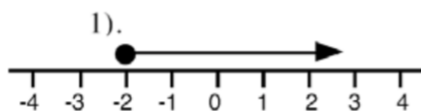
7). $x \leq 4$

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). $7 > x \geq 2$

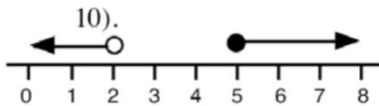
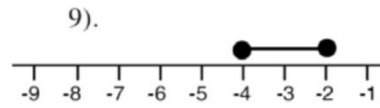
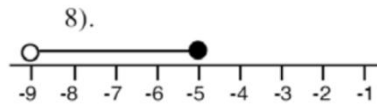
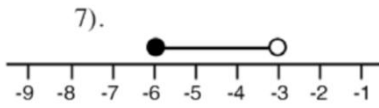
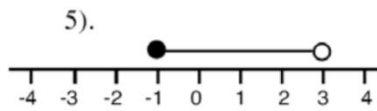
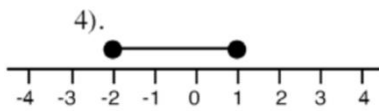
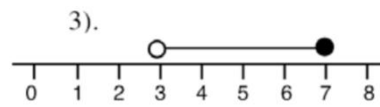
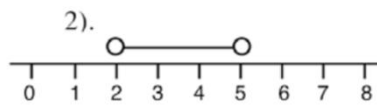
9). $-3 \leq x \leq 2$

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:



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

- a) $x > 11$ and $x < 15$ b) $-8 < x < 2$ and $x \leq -2$

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

Q104) Solve:

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

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

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

Q106) Solve:

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

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

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

Q108) Solve:

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

Q109) Solve:

- a) $-x + 5 \geq 10$ b) $2.5 < 7 - c$ c) $4x - 1 > -4$
 d) $\frac{x}{2} + 5 \leq -1$ e) $5x > 3x - 9$ f) $7 - 2x \leq 9x + 8$
 g) $8 < 4(2x - 1)$ h) $9 - 2(x + 5) < 8$ i) $5(-1 + 3x) > -9(x - 9)$
 j) $-\frac{1}{2}x^2 + 4x + 1 \geq -\frac{1}{2}x^2 - x$ k) $\frac{5y}{7} > 3 - \frac{y+2}{5}$

Answer Section

Factorisation – Answers

- | | | | |
|----------------|------------------|------------------|------------------|
| 1. $x(x+4)$ | 2. $x(x+6)$ | 3. $x(x+9)$ | 4. $x(x-10)$ |
| 5. $x(7-x)$ | 6. $x(12+x)$ | 7. $x(2-x)$ | 8. $x(15-x)$ |
| 9. $a(a-5)$ | 10. $c(c+8)$ | 11. $g(g-14)$ | 12. $p(11-p)$ |
| 13. $2x(x-2)$ | 14. $5x(x+2)$ | 15. $3n(n-3)$ | 16. $2g(g+4)$ |
| 17. $5n(n-3)$ | 18. $2d(2+3d)$ | 19. $4n(2+3n)$ | 20. $3f(1+5f)$ |
| 21. $7a(a-2a)$ | 22. $2w(1-6w)$ | 23. $7c(1+3c)$ | 24. $5u(u-4)$ |
| 25. $3x(2x-3)$ | 26. $2y(2-7y)$ | 27. $5n(2n + 3)$ | 28. $5p(p - 7p)$ |
| 29. $4m(2-3m)$ | 30. $2h(5 + 6h)$ | | |

Difference of two squares

- | | | | |
|----------------------|----------------------|----------------------|---------------------|
| 1. $(x+2)(x-2)$ | 2. $(x+3)(x-3)$ | 3. $(x+5)(x-5)$ | 4. $(x+10)(x-10)$ |
| 5. $(8+x)(8-x)$ | 6. $(7+x)(7-x)$ | 7. $(1+x)(1-x)$ | 8. $(6+x)(6-x)$ |
| 9. $(a+4)(a-4)$ | 10. $(c+9)(c-9)$ | 11. $2(g+3)(g-3)$ | 12. $4(p+3)(p-3)$ |
| 13. $2(x+5)(x-5)$ | 14. $5(x+1)(x-1)$ | 15. $3(n+5)(n-5)$ | 16. $2(g+10)(g-10)$ |
| 17. $3(2+n)(2-n)$ | 18. $2(3+p)(3-p)$ | 19. $8(1+u)(1-u)$ | 20. $(x+y)(x-y)$ |
| 21. $(p+q)(p-q)$ | 22. $(2p+7)(2p-7)$ | 23. $(4+5c)(4c-5c)$ | 24. $(6+9w)(6-9w)$ |
| 25. $(2x+3y)(2x-3y)$ | 26. $(3p+4q)(3p-4q)$ | 27. $(5m+9n)(5m-9n)$ | 28. $2(p+2q)(p-2q)$ |
| 29. $6(x+y)(x-y)$ | 30. $5(3m+n)(3m-n)$ | 31. $3(c+3d)(c-3d)$ | 32. $6(h+2k)(h-2k)$ |
| 33. $10(a+2c)(a-2c)$ | 34. $7(3u+v)(3u-v)$ | 35. $5(x+4y)(x-4y)$ | |

Fractional Factorisation

1. (a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{15}{8}$ (d) $\frac{3}{4}$ (e) $2a$ (f) $\frac{3b}{2}$
(g) $\frac{3}{2x}$ (h) $\frac{5}{3y}$ (i) $\frac{1}{4c}$ (j) $\frac{4}{a^2}$ (k) $\frac{1}{4p}$ (l) $\frac{6a}{c}$
(m) $\frac{2}{a}$ (n) $\frac{5x}{6y}$ (o) $\frac{v}{3t}$ (p) $\frac{5b^2}{a}$ (q) $\frac{6p}{5q}$ (r) $\frac{27x^2}{2}$
(s) $\frac{3n}{4}$ (t) $\frac{4df}{5e}$ (u) $\frac{3b^2}{4a}$ (v) $\frac{k}{7m}$ (w) $\frac{1}{2eg}$ (x) $\frac{7y^2}{12x^2}$
2. (a) $\frac{a+2b}{2}$ (b) $2(2x+3y)$ (c) $\frac{3+a}{b}$ (d) $\frac{x+y}{2}$
(e) $\frac{y+x}{6+y}$ (f) $\frac{a+2b}{3b}$ (g) $\frac{5b+3b^2}{2}$ (h) $\frac{7p+5q}{s}$
(i) $\frac{3}{2b-c}$ (j) $\frac{2x}{3(x+y)}$ (k) $\frac{t}{3r-t}$ (l) $\frac{1}{2a+3b}$
(m) $\frac{7p}{4}$ (n) $\frac{4}{3a}$ (o) $\frac{2n}{3}$ (p) $\frac{3x}{2}$
3. (a) $b-2$ (b) $x+9$ (c) $a-5$ (d) $y-6$ (e) $\frac{c+7}{2}$ (f) $\frac{a-8}{2}$
(g) $\frac{p+1}{5}$ (h) $\frac{q-3}{3}$ (i) $\frac{a-b}{3}$ (j) $\frac{x+y}{5}$ (k) $m-3$ (l) $\frac{d+4}{4}$

Fractions Answers

$$\begin{aligned} 46) 1. \quad & \frac{3}{5} \times \frac{1}{4} \\ & = \frac{3}{20} \end{aligned}$$

$$\begin{aligned} 57. \quad & \frac{2}{5} \times \frac{1}{3} \\ & = \frac{2}{15} \end{aligned}$$

$$\begin{aligned} 9. \quad & \frac{2}{4} \times \frac{1}{2} \\ & = \frac{2}{8} \end{aligned}$$

$$\begin{aligned} 13. \quad & \frac{3}{6} \times \frac{5}{7} \\ & = \frac{15}{28} \end{aligned}$$

$$\begin{aligned} 17. \quad & 1\frac{1}{2} \times \frac{1}{4} \\ & = \frac{3}{2} \times \frac{1}{4} \\ & = \frac{3}{8} \end{aligned}$$

$$\begin{aligned} 21. \quad & \frac{1}{4} \times 1\frac{2}{3} \\ & = \frac{1}{4} \times \frac{5}{3} \\ & = \frac{5}{12} \end{aligned}$$

$$\begin{aligned} 25. \quad & 1\frac{2}{5} \times 1\frac{1}{3} \\ & = \frac{7}{5} \times \frac{4}{3} \\ & = \frac{28}{15} = 1\frac{13}{15} \end{aligned}$$

$$\begin{aligned} 29. \quad & \frac{1}{2} \times \frac{3}{4} \times 1\frac{1}{2} \\ & = \frac{1}{2} \times \frac{3}{4} \times \frac{3}{2} \\ & = \frac{9}{16} \end{aligned}$$

$$\begin{aligned} 32. \quad & 4\frac{1}{2} \times 2\frac{1}{4} \times \frac{3}{5} \\ & = \frac{9}{2} \times \frac{9}{4} \times \frac{3}{5} \\ & = \frac{243}{60} = 6\frac{3}{40} \end{aligned}$$

$$\begin{aligned} 35. \quad & 6\frac{1}{2} \times \frac{1}{3} \times 1\frac{1}{4} \\ & = \frac{13}{2} \times \frac{1}{3} \times \frac{5}{4} \\ & = \frac{65}{24} = 2\frac{17}{24} \end{aligned}$$

$$\begin{aligned} 38. \quad & 5\frac{1}{3} \times 6\frac{1}{9} \times \frac{6}{11} \\ & = \frac{16}{3} \times \frac{28}{9} \times \frac{6}{11} \\ & = \frac{160}{11} \end{aligned}$$

$$\begin{aligned} 41. \quad & \frac{1}{2} \times \frac{3}{4} \times \frac{5}{8} \\ & = \frac{15}{64} \end{aligned}$$

$$42) 1. \frac{1}{x_1} \times \frac{4}{5}^c$$

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

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

$$= \frac{1}{5}$$

$$9. \frac{10}{4} \times \frac{5}{x_2}^c$$

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

$$13. \frac{3}{x_1} \times \frac{21}{10}$$

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

$$17. \frac{1}{x_1} \times \frac{15}{x_2}^2$$

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

$$21. \frac{1}{3} \times \frac{9}{x_1} \times \frac{x_2}{x_1}^2$$

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

$$25. \frac{1}{4} \times 1\frac{1}{2}$$

$$= \frac{1}{x_1} \times \frac{x_2}{2}$$

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

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

$$= \frac{15}{x_1} \times \frac{x_2}{5}$$

$$= 3$$

$$33. \frac{3}{8} \times 1\frac{7}{4} \times 1\frac{1}{2}$$

$$= \frac{x_1}{x_1} \times \frac{x_2}{x_1} \times \frac{x_3}{x_1}$$

$$= 1$$

$$19) \frac{2}{3} \times 12$$

$$= \frac{24}{3}$$

$$= 8$$

$$b) \frac{5}{x_1} \times 24$$

$$= 20$$

$$c) 28 \times \frac{2}{x_1}$$

$$= 8$$

$$d) 26 \times \frac{5}{x_2}$$

$$= \frac{25}{2} = 12\frac{1}{2}$$

$$e) \frac{7}{x_1} \times 28^5$$

$$= \frac{39}{2} = 17\frac{1}{2}$$

$$f) \frac{4}{x_1} \times 15^5$$

$$= \frac{20}{3} = 6\frac{2}{3}$$

$$g) \frac{7}{x_1} \times \frac{3}{x_2}$$

$$= \frac{27}{2} = 13\frac{1}{2}$$

$$h) \frac{1}{x_1} \times \frac{3}{x_2} \times 40^{20}$$

$$= 12$$

$$i) \frac{3}{x_1} \times \frac{3}{x_2} \times 50 \times 5$$

$$= \frac{45}{2} = 22\frac{1}{2}$$

$$j) \frac{1}{x_1} \times \frac{7}{x_2} \times 60 \times 5$$

$$= 35$$

$$k) \frac{3}{x_2} \times \frac{x_1}{5} \times 28^5$$

$$= \frac{15}{2} = 7\frac{1}{2}$$

$$l) \frac{14}{x_1} \times \frac{3}{x_2} \times 45^5$$

$$= \frac{15}{2} = 7\frac{1}{2}$$

$$50. 1. \frac{25}{12} = \frac{29}{12}$$

$$\text{reciprocal} = \frac{12}{29}$$

$$2. \frac{37}{74} = \frac{1}{2}$$

$$\text{reciprocal} = \frac{74}{37} = 2$$

$$3. \frac{17}{41}$$

$$\text{reciprocal} = \frac{41}{17}$$

$$4. 3\frac{4}{13} = \frac{43}{13}$$

$$\text{reciprocal} = \frac{13}{43}$$

$$5. \frac{12}{19}$$

$$\text{reciprocal} = \frac{19}{12} = 1\frac{7}{12}$$

$$6. 62$$

$$\text{reciprocal} = \frac{1}{62}$$

$$7. \frac{7}{55}$$

$$\text{reciprocal} = \frac{55}{7} = 7\frac{6}{7}$$

$$8. \frac{5}{36}$$

$$\text{reciprocal} = \frac{36}{5} = 7\frac{1}{5}$$

$$9. \frac{8}{9}$$

$$\text{reciprocal} = \frac{9}{8} = 1\frac{1}{8}$$

$$51) 1. \frac{1}{4} \div 2$$

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

$$= \frac{1}{8}$$

$$5. \frac{2}{6} \div 3$$

$$= \frac{2}{6} \times \frac{1}{3}$$

$$= \frac{2}{18}$$

$$9. \frac{3}{4} \div 2$$

$$= \frac{3}{4} \times \frac{1}{2}$$

$$= \frac{3}{8}$$

$$13. \frac{7}{10} \div 3$$

$$= \frac{7}{10} \times \frac{1}{3}$$

$$= \frac{7}{30}$$

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

$$= \frac{3}{2} \times \frac{1}{2}$$

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

$$21. 2\frac{2}{6} \div 5$$

$$= \frac{8}{3} \times \frac{1}{5}$$

$$= \frac{8}{15}$$

$$25. 4\frac{1}{4} \div 5$$

$$= \frac{17}{4} \times \frac{1}{5}$$

$$= \frac{17}{20}$$

$$52) 29. \frac{11}{14} \div 2$$

$$= \frac{11}{14} \times \frac{1}{2}$$

$$= \frac{11}{28}$$

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

$$= \frac{9}{11} \times \frac{1}{3}$$

$$= \frac{3}{11}$$

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

$$= \frac{5}{6} \times \frac{1}{20}$$

$$= \frac{1}{24}$$

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

$$= \frac{4}{5} \times \frac{1}{10}$$

$$= \frac{4}{50}$$

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

$$= \frac{9}{2} \times \frac{1}{6}$$

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

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

$$= \frac{4}{3} \times \frac{1}{8}$$

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

$$53. 1\frac{1}{3} \div 9$$

$$= \frac{4}{3} \times \frac{1}{9}$$

$$= \frac{4}{27}$$

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

$$= \frac{25}{2} \times \frac{1}{5}$$

$$= \frac{25}{10} = 2\frac{1}{2}$$

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

$$= \frac{7}{2} \times \frac{1}{2}$$

$$= \frac{7}{4} = 1\frac{3}{4}$$

$$\begin{aligned}
 65. \quad 19\frac{1}{2} \div 15 \\
 &= \frac{29^{\cancel{10}}}{2} \times \frac{1}{15} \\
 &= \frac{13}{10} = \underline{\underline{1\frac{3}{10}}}
 \end{aligned}$$

$$\begin{aligned}
 83) \quad 1. \quad \frac{2}{5} \div \frac{1}{2} \\
 &= \frac{2}{5} \times \frac{2}{1} \\
 &= \underline{\underline{\frac{4}{5}}}
 \end{aligned}$$

$$\begin{aligned}
 5. \quad \frac{1}{2} \div \frac{2}{3} \\
 &= \frac{1}{2} \times \frac{3}{2} \\
 &= \underline{\underline{\frac{3}{4}}}
 \end{aligned}$$

$$\begin{aligned}
 9. \quad 1\frac{1}{2} \div 1\frac{3}{4} \\
 &= \frac{3}{2} \times \frac{4}{8} \\
 &= \underline{\underline{\frac{12}{16}}}
 \end{aligned}$$

$$\begin{aligned}
 13. \quad 3\frac{1}{3} \div 3\frac{1}{2} \\
 &= \frac{10}{3} \times \frac{2}{4} \\
 &= \underline{\underline{\frac{20}{12}}}
 \end{aligned}$$

$$\begin{aligned}
 17. \quad 1\frac{1}{2} \div \frac{1}{2} \\
 &= \frac{3}{2} \times \frac{2}{1} \\
 &= \underline{\underline{\frac{6}{2} = 3}}
 \end{aligned}$$

$$\begin{aligned}
 21. \quad 5\frac{1}{2} \div 1\frac{1}{2} \\
 &= \frac{11}{2} \times \frac{2}{4} \\
 &= \underline{\underline{\frac{22}{8} = 2\frac{7}{8}}}
 \end{aligned}$$

$$\begin{aligned}
 25. \quad \frac{3}{10} \div \frac{1}{2} \\
 &= \frac{3}{10} \times \frac{2}{1} \\
 &= \underline{\underline{\frac{6}{10}}}
 \end{aligned}$$

$$\begin{aligned}
 29. \quad \frac{3}{8} \div \frac{1}{4} \\
 &= \frac{3}{8} \times \frac{4}{1} \\
 &= \underline{\underline{\frac{12}{8} = 1\frac{1}{2}}}
 \end{aligned}$$

$$\begin{aligned}
 33. \quad 3\frac{1}{3} \div 7\frac{1}{2} \\
 &= \frac{10}{3} \div \frac{15}{2} \\
 &= \frac{10}{3} \times \frac{2}{15} \\
 &= \underline{\underline{\frac{4}{3}}}
 \end{aligned}$$

$$\begin{aligned}
 37. \quad 4\frac{4}{5} \div 5\frac{1}{3} \\
 &= \frac{24}{5} \div \frac{16}{3} \\
 &= \frac{24}{5} \times \frac{3}{16} \\
 &= \underline{\underline{\frac{9}{5}}}
 \end{aligned}$$

$$\begin{aligned}
 41. \quad \frac{2}{3} \div \frac{2}{3} \\
 &= \frac{2}{3} \div \frac{12}{12} \\
 &= \frac{2}{3} \times \frac{3}{12} \\
 &= \underline{\underline{\frac{6}{12} = \frac{1}{2}}}
 \end{aligned}$$

$$\begin{aligned}
 46. \quad \frac{2\frac{1}{4}}{1\frac{7}{8}} \\
 &= \frac{9}{4} \div \frac{15}{8} \\
 &= \frac{9}{4} \times \frac{8}{15} \\
 &= \underline{\underline{\frac{6}{3} = 2}}
 \end{aligned}$$

54) $\frac{1}{\sqrt{5^2 + 4^2}}$

" $\frac{1}{\sqrt{29}}$

" $\frac{1}{\sqrt{41}}$

" $\frac{1}{\sqrt{52}}$

" $\frac{1}{\sqrt{1+4^2}}$

" $\frac{1}{\sqrt{1+2^2}}$

" $\frac{1}{\sqrt{1+4^2}}$

" $\frac{1}{\sqrt{4^2 + 3^2}}$

" $\frac{1}{\sqrt{5^2 + 1^2}}$

" $\frac{1}{\sqrt{4^2 + 3^2}}$

~~" $\frac{1}{\sqrt{4^2 + 3^2}}$~~

" $\frac{1}{\sqrt{5^2 + 1^2}}$

55) 1. $\frac{1}{\sqrt{5^2 + 4^2}}$

2. $\frac{1}{\sqrt{5^2 + 1^2}}$

3. $\frac{1}{\sqrt{5^2 + 4^2}}$

4. $\frac{1}{\sqrt{5^2 + 4^2}}$

5. $\frac{1}{\sqrt{5^2 + 1^2}}$

6. $\frac{1}{\sqrt{2^2 + 2^2}}$

7. $\frac{1}{\sqrt{5^2 + 1^2}}$

8. $\frac{1}{\sqrt{5^2 + 4^2}}$

9. $\frac{1}{\sqrt{5^2 + 4^2}}$

10. $\frac{1}{\sqrt{5^2 + 4^2}}$

$$\begin{aligned}
& \frac{1}{6} + \frac{1}{2} \times \left(2 - \frac{1}{6}\right) \\
&= \frac{1}{6} + \frac{1}{2} \times \frac{11}{6} \\
&= \frac{1}{6} + \frac{11}{12} \\
&= \frac{2}{12} + \frac{11}{12} \\
&= \frac{13}{12}
\end{aligned}$$

$$\begin{aligned}
& 2 - \frac{1}{4} + \frac{1}{2} \times \frac{1}{4} \\
&= 2 - \frac{1}{4} + \frac{1}{8} \\
&= \frac{16}{8} - \frac{2}{8} + \frac{1}{8} \\
&= \frac{15}{8} = \underline{\underline{1\frac{7}{8}}}
\end{aligned}$$

$$\begin{aligned}
& 4 \times \left(\frac{1}{2} + \frac{2}{3} \div \frac{1}{2}\right) \\
&= 4 \times \left(\frac{1}{2} + \frac{2}{3} \times \frac{2}{1}\right) \\
&= 4 \times \left(\frac{1}{2} + \frac{4}{3}\right) \\
&= 4 \times 1 \\
&= \underline{\underline{4}}
\end{aligned}$$

$$\begin{aligned}
& \left(\left(\frac{1}{15} - \frac{1}{2}\right) + 1\right) \times \frac{1}{2} \\
&= \left(\frac{2}{30} + 1\right) \times \frac{1}{2} \\
&= \frac{32}{30} \times \frac{1}{2} \\
&= \frac{16}{15} = \underline{\underline{1\frac{1}{15}}}
\end{aligned}$$

$$\begin{aligned}
& \frac{1}{3} \times (7 - 1) \\
&= \frac{1}{3} \times 6 \\
&= \underline{\underline{2}}
\end{aligned}$$

$$\begin{aligned}
& \frac{5}{6} - \left(\frac{2}{3} - \frac{1}{6}\right) \\
&= \frac{5}{6} - \left(\frac{4}{6} - \frac{1}{6}\right) \\
&= \frac{5}{6} - \frac{3}{6} \\
&= \frac{2}{6} = \underline{\underline{\frac{1}{3}}}
\end{aligned}$$

$$\begin{aligned}
& 1 \div \left(1 \div \left(3 \times \frac{1}{2}\right)\right) \\
&= 1 \div \left(1 \div \frac{3}{2}\right) \\
&= 1 \div \left(1 \times \frac{2}{3}\right) \\
&= 1 \div \frac{2}{3} \\
&= 1 \times \frac{3}{2} \\
&= \frac{3}{2} = \underline{\underline{1\frac{1}{2}}}
\end{aligned}$$

$$\begin{aligned}
& \left(1 - \frac{1}{5}\right) \times \frac{1}{4} \\
&= \frac{4}{5} \times \frac{1}{4} \\
&= \underline{\underline{\frac{1}{5}}}
\end{aligned}$$

$$\begin{aligned}
 & 1 - \left(\frac{1}{2} + \cancel{\frac{1}{2}} \times \frac{1}{8} \right) \\
 & = 1 - \left(\frac{1}{2} + \frac{1}{4} \right) \\
 & = 1 - \left(\frac{2}{4} + \frac{1}{4} \right) \\
 & = 1 - \frac{3}{4} \\
 & = \underline{\underline{\frac{1}{4}}}
 \end{aligned}$$

$$\begin{aligned}
 & 3 - \left(\frac{1}{5} + 1 \div \frac{1}{2} \right) \\
 & = 3 - \left(\frac{1}{5} + 1 \times \frac{2}{1} \right) \\
 & = 3 - \left(\frac{1}{5} + 2 \right) \\
 & = 3 - \frac{11}{5} \\
 & = \frac{15}{5} - \frac{11}{5} \\
 & = \underline{\underline{\frac{4}{5}}}
 \end{aligned}$$

$$\begin{aligned}
 58) \text{ a) } & 2\frac{1}{3} - 1\frac{1}{2} \times 3\frac{1}{3} \\
 & = \frac{7}{3} - \frac{5}{2} \times \frac{10}{3} \\
 & = \frac{7}{3} - \frac{50}{6} \\
 & = \frac{7}{3} - \frac{15}{3} \\
 & = \frac{-8}{3} = \underline{\underline{-2\frac{2}{3}}}
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } & \left(2\frac{1}{3} - 1\frac{1}{2} \right) \times 3\frac{1}{3} \\
 & = \left(\frac{7}{3} - \frac{3}{2} \right) \times \frac{10}{3} \\
 & = \left(\frac{14}{6} - \frac{9}{6} \right) \times \frac{10}{3} \\
 & = \frac{5}{6} \times \frac{10}{3} \\
 & = \frac{25}{9} = \underline{\underline{2\frac{7}{9}}}
 \end{aligned}$$

$$\begin{aligned}
 \text{c) } & \left(3\frac{1}{4} - 1\frac{2}{3} \right) \times \left(5\frac{1}{3} - 2\frac{1}{2} \right) \\
 & = \left(\frac{13}{4} - \frac{5}{3} \right) \times \left(\frac{16}{3} - \frac{5}{2} \right) \\
 & = \left(\frac{39}{12} - \frac{20}{12} \right) \times \left(\frac{32}{6} - \frac{15}{6} \right) \\
 & = \frac{19}{12} \times \frac{17}{6} \\
 & = \underline{\underline{\frac{323}{72} = 4\frac{35}{72}}}
 \end{aligned}$$

$$\begin{aligned}
 \text{d) } & \left(2\frac{3}{4} \right)^2 - \left(3\frac{1}{2} \right)^2 \\
 & = \left(\frac{11}{4} \right)^2 - \left(\frac{7}{2} \right)^2 \\
 & = \frac{121}{16} - \frac{49}{4} \\
 & = \frac{121}{16} - \frac{196}{16} \\
 & = \underline{\underline{-\frac{75}{16} = -4\frac{11}{16}}}
 \end{aligned}$$

$$59) a) -6x \\ = -6 \times \frac{1}{2} \\ = \underline{\underline{-3}}$$

$$7x - x^2 \\ = 7\left(\frac{1}{2}\right) - \left(\frac{1}{2}\right)^2 \\ = \frac{7}{2} - \frac{1}{4} \\ = \frac{14}{4} - \frac{1}{4} \\ = \underline{\underline{\frac{13}{4} = 3\frac{1}{4}}}}$$

$$x - 3 \\ = \frac{1}{2} - 3 \\ = \frac{1}{2} - \frac{6}{2} \\ = \underline{\underline{-\frac{5}{2} = -2\frac{1}{2}}}}$$

$$6(x-3) \\ = 6\left(\frac{1}{2} - 3\right) \\ = \cancel{6} \times -\frac{5}{2} \\ = \underline{\underline{-15}}$$

$$b) -6x \\ = -6 \times \frac{4}{5} \\ = \underline{\underline{-\frac{24}{5} = -4\frac{4}{5}}}}$$

$$7x - x^2 \\ = 7\left(\frac{4}{5}\right) - \left(\frac{4}{5}\right)^2 \\ = \frac{28}{5} - \frac{16}{25} \\ = \frac{140}{25} - \frac{16}{25} \\ = \underline{\underline{\frac{124}{25} = 4\frac{24}{25}}}}$$

$$x - 3 \\ = \frac{4}{5} - 3 \\ = \frac{4}{5} - \frac{15}{5} \\ = \underline{\underline{-\frac{11}{5} = -2\frac{1}{5}}}}$$

$$6(x-3) \\ = 6\left(\frac{4}{5} - 3\right) \\ = 6 \times -\frac{11}{5} \\ = \underline{\underline{-\frac{66}{5} = -13\frac{1}{5}}}}$$

$$c) -6x \\ = -6 \times 2\frac{2}{3} \\ = \cancel{6} \times \frac{8}{3} \\ = \underline{\underline{-16}}$$

$$7x - x^2 \\ = 7\left(2\frac{2}{3}\right) - \left(2\frac{2}{3}\right)^2 \\ = 7\left(\frac{8}{3}\right) - \left(\frac{8}{3}\right)^2 \\ = \frac{56}{3} - \frac{64}{9} \\ = \frac{168}{9} - \frac{64}{9} \\ = \underline{\underline{\frac{104}{9} = 11\frac{5}{9}}}}$$

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

$$6(x-3) \\ = 6\left(2\frac{2}{3} - 3\right) \\ = \cancel{6} \times -\frac{1}{3} \\ = \underline{\underline{-2}}$$

Circle - Answers

60. a) $C = \pi \times D$
 $C = \pi \times 13$
 $C = 40.84 \text{ yd.}$

b) $C = 15\pi \text{ yd.}$

c) $C = \pi \times 6$
 $C = 18.85 \text{ ft.}$

d) $C = 6\pi \text{ ft.}$

61. a) $C = \pi \times 20$
 $C = 62.83 \text{ in.}$

b) $C = 20\pi \text{ in.}$

c) $C = \pi \times 34$
 $C = 106.81 \text{ ft.}$

d) $C = 34\pi \text{ ft.}$

62. a) $C = \pi \times 15$
 $C = 47.12 \text{ in.}$

b) $C = 15\pi \text{ in.}$

c) $C = \pi \times 14$
 $C = 43.98 \text{ yd.}$

d) $C = 14\pi \text{ yd.}$

61. a) $P = (\pi \times D \div 2) + 40$
 $P = (\pi \times 10 \div 2) + 40$
 $P = 25.71 \text{ cm.}$

b) $P = (\pi \times 12 \div 4) + 6 + 6$
 $P = 21.42 \text{ cm.}$

c) $P = (\frac{3}{4} \times \pi \times 10) + 5 + 5$
 $P = 33.56 \text{ cm.}$

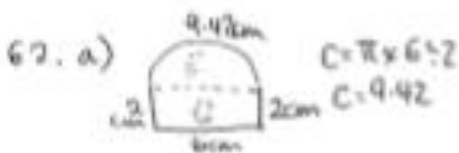
d) $P = (\pi \times 16 \div 6) + 8 + 8$
 $P = 55.48 \text{ cm.}$

e) $P = (\frac{3}{4} \times \pi \times 4) + 2 + 2$
 $P = 13.42 \text{ cm.}$

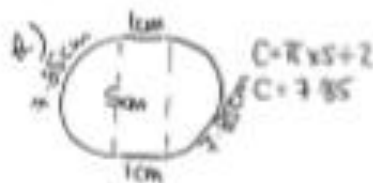
f) $P = (\pi \times 12 \div 2) + 12 + 12$
 $P = 30.85 \text{ cm.}$

g) $P = (\pi \times 11 \div 4) + 5.5 + 5.5$
 $P = 19.64 \text{ cm.}$

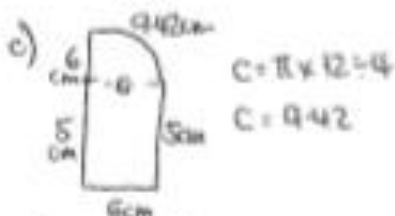
h) $P = (\pi \times 5 \times \frac{3}{4}) + 2.5 + 2.5$
 $P = 16.78 \text{ cm.}$



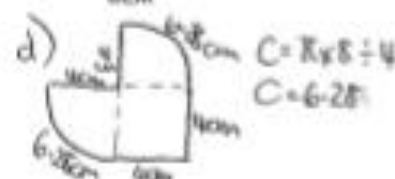
$P = 2 + 6 + 2 + 9.42$
 $P = 19.42 \text{ cm.}$



$P = 1 + 7.85 + 1 + 7.85$
 $P = 17.7 \text{ cm.}$



$P = 9.42 + 5 + 6 + 5 + 6$
 $P = 31.42 \text{ cm.}$



$P = 6.28 + 4 + 4 + 6.28 + 4 + 4$
 $P = 28.56 \text{ cm.}$

63. a) $r = 1.5 \text{ cm}$
 $D = 3 \text{ cm}$

(i) $C = \pi \times 3$
 $C = 9.42 \text{ cm}$

(ii) 9.42×100
 $= 942 \text{ cm}$
 $= 9.42 \text{ metres}$

(i) $C = \pi \times 3.5$
 $C = 11.00 \text{ m}$
 $C = 1100 \text{ cm}$

(ii) $1100 \div 20$
 $= 55 \text{ tiles}$

64.

Circumference	Radius	Diameter
$10\pi \text{ ft.}$	5 ft.	10 ft.
$24\pi \text{ in.}$	12 in.	24 in.
$34\pi \text{ yd.}$	17 yd.	34 yd.
$40\pi \text{ in.}$	20 in.	40 in.
$16\pi \text{ ft.}$	8 ft.	16 ft.

65. a) $A = \pi \times 15^2$ b) $A = 225\pi \text{ ft.}^2$
 $A = 706.86 \text{ ft.}^2$

a) $A = \pi \times 11^2$ b) $A = 121\pi \text{ in.}^2$
 $A = 380.13 \text{ in.}^2$

③ a) $A = \pi \times 9^2$ b) $A = 81\pi \text{ yd.}^2$
 $A = 254.47 \text{ yd.}^2$

④ a) $A = \pi \times 6^2$ b) $A = 36\pi \text{ yd.}^2$
 $A = 113.10 \text{ yd.}^2$

⑤ a) $A = \pi \times 3^2$ b) $A = 9\pi \text{ in.}^2$
 $A = 28.27 \text{ in.}^2$

⑥ a) $A = \pi \times 17^2$ b) $A = 289\pi \text{ ft.}^2$
 $A = 907.92 \text{ ft.}^2$

66. a) $A = \pi \times 5^2 \div 2$
 $A = 36.27 \text{ cm}^2$

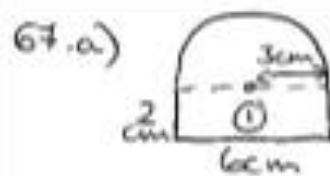
b) $A = \pi \times 6^2 \div 4$
 $A = 28.27 \text{ cm}^2$

c) $A = \pi \times 5^2 \times \frac{3}{4}$
 $A = 58.90 \text{ cm}^2$

d) $A = \pi \times 8^2 \div 4$
 $A = 50.27 \text{ cm}^2$

e) $A = \pi \times 2^2 \times \frac{3}{4}$
 $A = 9.42 \text{ cm}^2$

f) $A = \pi \times 6^2 \div 2$
 $A = 56.55 \text{ cm}^2$



$$A_1 = 2 \times 6$$

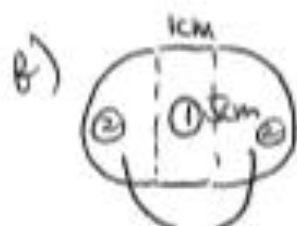
$$A_2 = \pi \times 3^2 \div 2$$

$$A_1 = 12 \text{ cm}^2$$

$$A_2 = 14.14 \text{ cm}^2$$

$$\text{Total area} = 12 + 14.14$$

$$= \underline{\underline{26.14 \text{ cm}^2}}$$



$$A_1 = 1 \times 5$$

$$A_2 = \pi \times 2.5^2$$

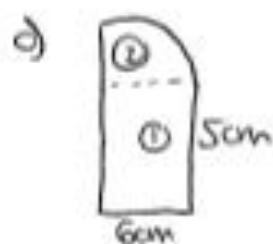
$$A_1 = 5 \text{ cm}^2$$

$$A_2 = 19.63 \text{ cm}^2$$

$$\text{Total area} = 5 + 19.63$$

$$= \underline{\underline{24.63 \text{ cm}^2}}$$

2 semicircles
of same size
= 1 full circle



$$A_1 = 6 \times 5$$

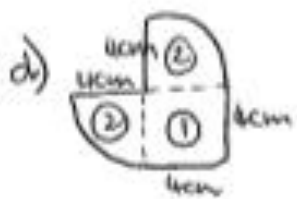
$$A_2 = \pi \times 6^2 \div 4$$

$$A_1 = 30 \text{ cm}^2$$

$$A_2 = 28.27 \text{ cm}^2$$

$$\text{Total area} = 30 + 28.27$$

$$= \underline{\underline{58.27 \text{ cm}^2}}$$



$$A_1 = 4 \times 4$$

$$A_2 = \pi \times 4^2 \div 4$$

$$A_1 = 16 \text{ cm}^2$$

$$A_2 = 12.57 \text{ cm}^2$$

$$\text{Total area} = 16 + 12.57 + 12.57$$

$$= \underline{\underline{41.14 \text{ cm}^2}}$$

66. g)

$$A = \pi \times 5.5^2 \div 4$$

$$\underline{\underline{A = 23.76 \text{ cm}^2}}$$

h)

$$A = \frac{3}{4} \times \pi \times 2.5^2$$

$$\underline{\underline{A = 14.73 \text{ cm}^2}}$$

68. 12 inch pizza: $A = \pi \times 6^2$

$$A = 36\pi \text{ in}^2$$

6 inch pizza: $A = \pi \times 3^2$

$$A = 9\pi \text{ in}^2$$

$$36\pi = 4 \times 9\pi$$

ie. you get 4 times as much if you buy
a 12 inch pizza than if you buy a 6 inch
pizza.

69. ① $A = 100\pi \text{ ft}^2$
 $r = 10 \text{ ft.}$
 $D = 20 \text{ ft.}$

② $A = 625\pi \text{ in}^2$
 $r = 25 \text{ in.}$
 $D = 50 \text{ in.}$

③ $A = 49\pi \text{ yd}^2$
 $r = 7 \text{ in.}$
 $D = 14 \text{ in.}$

70. ① $C = 77.87 \text{ in}$
 $D = \frac{77.87}{\pi}$
 $D = 24.78679\dots$
 $r = 12.39339\dots$
 $A = \pi \times 12.39^2$
 $A = 482.27 \text{ in}^2$

② $C = 111.78 \text{ ft}$
 $D = \frac{111.78}{\pi}$
 $D = 35.5806\dots$
 $r = 17.79033\dots$
 $A = \pi \times 17.79^2$
 $A = 994.26 \text{ ft}^2$

③ $C = 56.08 \text{ yd.}$
 $D = \frac{56.08}{\pi}$
 $D = 17.8508\dots$
 $r = 8.9254\dots$
 $A = \pi \times 8.93^2$
 $A = 250.53 \text{ yd}^2$

71. ① $A = 19.31 \text{ in}^2$
 $A = \pi r^2$
 $19.31 = \pi \times r^2$
 $r^2 = \frac{19.31}{\pi}$
 $r = \sqrt{\frac{19.31}{\pi}}$
 $r = 2.47922\dots$
 $D = 4.95845\dots$
 $C = \pi \times 4.96$
 $C = 15.58 \text{ in.}$

② $A = 151.67 \text{ yd}^2$
 $151.67 = \pi \times r^2$
 $r^2 = \frac{151.67}{\pi}$
 $r = \sqrt{\frac{151.67}{\pi}}$
 $r = 6.94824\dots$
 $D = 13.8964\dots$
 $C = \pi \times 13.90$
 $C = 43.67 \text{ yd.}$

③ $A = 168.25 \text{ ft}^2$
 $168.25 = \pi \times r^2$
 $r^2 = \frac{168.25}{\pi}$
 $r = \sqrt{\frac{168.25}{\pi}}$
 $r = 7.318171\dots$
 $D = 14.6363\dots$
 $C = \pi \times 14.64$
 $C = 45.99 \text{ ft.}$

Equations - Answers

$$\begin{array}{r}
 72) \text{ a) } x^2 + 4x + 1 = x^2 - 3x + 8 \\
 \quad \quad \quad -x^2 \quad \quad \quad -x^2 \\
 \quad \quad \quad 4x + 1 = -3x + 8 \\
 \quad \quad \quad +3x \quad +3x \\
 \quad \quad \quad -1 \quad -1 \\
 \quad \quad \quad 7x = 7 \\
 \quad \quad \quad \div 7 \quad \div 7 \\
 \quad \quad \quad \underline{x = 1}
 \end{array}$$

$$\begin{array}{r}
 \text{b) } 3 - x^2 - 9x = -x^2 + 5 - 4x \\
 \quad \quad \quad +x^2 \quad \quad \quad +x^2 \\
 \quad \quad \quad 3 - 9x = 5 - 4x \\
 \quad \quad \quad +4x \quad \quad +4x \\
 \quad \quad \quad -5 \quad \quad -5 \\
 \quad \quad \quad -5x = 2 \\
 \quad \quad \quad \div -5 \quad \div -5 \\
 \quad \quad \quad \underline{x = -\frac{2}{5}}
 \end{array}$$

$$\begin{array}{r}
 \text{c) } x(x-2) = 5 + x^2 - 3x \\
 \cancel{x^2} - 2x = 5 + \cancel{x^2} - 3x \\
 \quad + 5x \quad + 3x \\
 \quad \quad \underline{x = 5}
 \end{array}$$

$$\begin{array}{r}
 \text{d) } 7 - 2x^2 + 4x = -2x(5+x) \\
 7 - 2x^2 + 4x = -10x - 2x^2 \\
 \quad -7 \quad \quad -7 \\
 \quad 4x = -10x - 7 \\
 \quad +10x \quad +10x \\
 \quad 14x = -7 \\
 \quad \frac{14x}{14} = \frac{-7}{14} \\
 \quad \underline{x = -\frac{1}{2}}
 \end{array}$$

$$\begin{array}{r}
 \frac{5}{2} \quad 3 \\
 \frac{2x}{5} \quad x \\
 \hline
 2x \quad 14
 \end{array}$$

$$\begin{array}{r}
 \frac{2}{6} \quad x \\
 \hline
 \frac{-12}{3} \quad \frac{-24}{x} \quad \frac{-24}{12} \\
 \frac{2x}{3} \quad x \quad \frac{x^2}{12}
 \end{array}$$

$$\begin{array}{r}
 \text{e) } (x-2)(x+3) = (x-6)(x-8) \\
 \cancel{x^2} + x - 6 = \cancel{x^2} - 14x + 48 \\
 \quad +14x \quad \quad +14x \\
 \quad +6 \quad \quad +6 \\
 \quad 15x = 54 \\
 \quad \div 15 \quad \div 15 \\
 \quad \underline{x = \frac{54}{15}} \\
 \quad \underline{x = \frac{18}{5}}
 \end{array}$$

$$\begin{array}{r}
 \text{f) } \left(\frac{x}{6} + 3\right)\left(\frac{x}{3} + 8\right) = \left(2 + \frac{x}{6}\right)\left(-12 + \frac{x}{2}\right) \\
 \cancel{\frac{x^2}{12}} + 3x + 24 = \cancel{\frac{x^2}{12}} - x - 24 \\
 \quad +x \quad \quad +x \\
 \quad 4x + 24 = -24 \\
 \quad -24 \quad -24 \\
 \quad 4x = -48 \\
 \quad \frac{4x}{4} = \frac{-48}{4} \\
 \quad \underline{x = -12}
 \end{array}$$

$$\begin{array}{r}
 \text{g) } (x+9)^2 = 21 - 2x + x^2 \\
 \cancel{x^2} + 18x + 81 = 21 - 2x + \cancel{x^2} \\
 \quad +2x \quad +2x \\
 \quad 20x + 81 = 21 \\
 \quad -81 \quad -81 \\
 \quad 20x = -60 \\
 \quad \frac{20x}{20} = \frac{-60}{20} \\
 \quad \underline{x = -3}
 \end{array}$$

$$\begin{array}{r}
 \text{h) } x^2 - (-3+x)^2 + 8 = 0 \\
 x^2 - (x^2 - 6x + 9) + 8 = 0 \\
 x^2 - x^2 + 6x - 9 + 8 = 0 \\
 \quad 6x - 1 = 0 \\
 \quad +1 \quad +1 \\
 \quad 6x = 1 \\
 \quad \frac{6x}{6} = \frac{1}{6} \\
 \quad \underline{x = \frac{1}{6}}
 \end{array}$$

93. a)



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

$$x^2 + 4x + 4 = x^2 + 64$$

$$4x = 60$$

$$x = 15 \text{ units}$$

Lengths: $x = 15$, $x+2 = 17$, 8 units

b)



$$(x+5)^2 = x^2 + 10^2$$

$$x^2 + 10x + 25 = x^2 + 100$$

$$10x = 75$$

$$x = 7.5 \text{ units}$$

Lengths: $x = 7.5$, $x+5 = 12.5$, 10 units

c)



$$(x-7)^2 = (x-12)^2 + 9^2$$

$$x^2 - 14x + 49 = x^2 - 24x + 144 + 81$$

$$x^2 - 14x + 49 = x^2 - 24x + 225$$

$$10x + 49 = 225$$

$$10x = 176$$

$$x = 17.6 \text{ units}$$

Lengths: $x-7 = 10.6$, $x-12 = 5.6$, 9 units

d)



$$(2x)^2 = (2x-2)^2 + 12^2$$

$$4x^2 = 4x^2 - 8x + 4 + 144$$

$$4x^2 = 4x^2 - 8x + 148$$

$$8x = 148$$

$$x = 18.5 \text{ units}$$

Lengths: $2x = 37$, $2x-2 = 35$, 12 units

94)

$$\text{Area of rectangle} = (x+4)(x-2)$$

$$= x^2 + 2x - 8$$

$$\text{Area of square} = x \times x$$

$$= x^2$$

$$\text{Area of rectangle} = \text{Area of square}$$

$$x^2 + 2x - 8 = x^2$$

$$2x = 8$$

$$x = 4$$

95) a)

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

$$8x - 3 = 9$$

$$8x = 12$$

$$x = \frac{12}{8}$$

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

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

b)

$$1 + \frac{5}{2}x = 16$$

$$\frac{5}{2}x = 15$$

$$2 + 5x = 32$$

$$5x = 30$$

$$x = 6$$

$$x = 6$$

$$x = 6$$

$$c) \frac{9x}{2} = 3 + \frac{3x}{4}$$

$$18x = 12 + 3x$$

$$15x = 12$$

$$x = \frac{12}{15}$$

$$x = \frac{4}{5}$$

$$x = \frac{4}{5}$$

$$x = \frac{4}{5}$$

$$x = \frac{4}{5}$$

$$x = \frac{4}{5}$$

$$x = \frac{4}{5}$$

$$d) \frac{1}{6}x = \frac{2}{3}(x-9)$$

$$\begin{array}{r} \times 6 \qquad \times 6 \\ x = 4(x-9) \\ x = 4x - 36 \\ -4x \quad -4x \\ \hline -3x = -36 \\ \div 3 \quad \div 3 \\ \hline x = 12 \end{array}$$

$$e) \frac{3x}{4} + x = \frac{7x}{8} + 2x - 9$$

$$\begin{array}{r} \times 8 \qquad \times 8 \\ 6x + 8x = 7x + 16x - 72 \\ 14x = 23x - 72 \\ -23x \quad -23x \\ \hline -9x = -72 \\ \div -9 \quad \div -9 \\ \hline x = 8 \end{array}$$

$$f) \frac{2}{5}(x+5) = \frac{9}{2}$$

$$\begin{array}{r} \times 10 \qquad \times 10 \\ 4(x+5) = 45 \\ 4x + 20 = 45 \\ -20 \quad -20 \\ \hline 4x = 25 \\ \div 4 \quad \div 4 \\ \hline x = \frac{25}{4} \end{array}$$

$$g) \frac{3}{5} + \frac{2}{3}x = 4$$

$$\begin{array}{r} \times 15 \qquad \times 15 \\ 9 + 10x = 60 \\ -9 \quad -9 \\ \hline 10x = 51 \\ \div 10 \quad \div 10 \\ \hline x = \frac{51}{10} \end{array}$$

$$h) \frac{2x}{5} = \frac{3}{2} + \frac{1}{4}x$$

$$\begin{array}{r} \times 20 \qquad \times 20 \\ 8x = 30 + 5x \\ -5x \quad -5x \\ \hline 3x = 30 \\ \div 3 \quad \div 3 \\ \hline x = 10 \end{array}$$

$$i) \frac{2}{7}(3x+6) = \frac{3}{10}$$

$$\begin{array}{r} \times 70 \qquad \times 70 \\ 20(3x+6) = 21 \\ 60x + 120 = 21 \\ -120 \quad -120 \\ \hline 60x = -99 \\ \div 60 \quad \div 60 \\ \hline x = -\frac{33}{20} \end{array}$$

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

$$\begin{array}{r} \times 12 \qquad \times 12 \\ 4(4x-1) - 3(3x-4) = 72 - 6(x+2) \\ 16x - 4 - 9x + 12 = 72 - 6x - 12 \\ 7x + 8 = 60 - 6x \\ +6x \quad +6x \\ \hline 13x + 8 = 60 \\ -8 \quad -8 \\ \hline 13x = 52 \\ \div 13 \quad \div 13 \\ \hline x = 4 \end{array}$$

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

$$\begin{array}{r} \times 12 \qquad \times 12 \\ 4(5x-2) - 3(x-8) + 24 = 6(x+14) \\ 20x - 8 - 3x + 24 + 24 = 6x + 84 \\ 17x + 40 = 6x + 84 \\ -6x \quad -6x \\ \hline 11x + 40 = 84 \\ -40 \quad -40 \\ \hline 11x = 44 \\ \div 11 \quad \div 11 \\ \hline x = 4 \end{array}$$

16) a) $x > -2$ b) $y \leq 9$ c) $2 < p$

- 17) 1) x is greater than or equal to 3 2) x is less than -1
 3) y is greater than or equal to -2 4) x is greater than 1
 5) x is less than or equal to 0.

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

99) a) $3 < x < 9$ b) $-2 < m < 2$ c) $-1 < x \leq 0$ d) $-6 \leq k < 5$

100) 1) x is greater than or equal to 1 but less than or equal to 4

2) x lies between 5 and 7

3) x is greater than 3 but less than or equal to 7

4) x is greater than or equal to 0 but less than 5

101) 1) $1 \leq x < 6$ 2) $2 < x < 5$ 3) $3 < x \leq 7$ 4) $-2 \leq x \leq 1$

5) $-1 \leq x < 3$ 6) $-3 < x < 3$ 7) $-6 \leq x < -3$ 8) $-9 < x \leq -5$

9) $-4 \leq x \leq -2$ 10) $x < 2, x \geq 5$ 11) $x \leq -2, x > 1$ 12) $x \leq -5, x \geq -3$

102) a) $11 < x < 15$ b) $-8 < x \leq -2$ or $-8 < x < -3$

103) $-9, -8, -7, -6$

104) a) $y + 9 \geq 15$
 $\quad \quad -9 \quad -9$
 $y \geq 6$

b) $-2 + c < -7$
 $\quad \quad +2 \quad +2$
 $c < -5$

c) $7m < -77$
 $\quad \quad \div 7 \quad \div 7$
 $m < -11$

d) $\frac{x}{2} \leq 8$
 $\quad \quad \times 2 \quad \times 2$
 $x \leq 16$

105) a) $-9 > x$
 $x < -9$

b) $6 < p$
 $p > 6$

c) $19 > k$
 $k < 19$

106) a) $6 < 2x$
 $\quad \quad 2x > 6$
 $\quad \quad \div 2 \quad \div 2$
 $x > 3$

b) $9 > -1 + x$
 $\quad \quad +1 \quad +1$
 $10 > x$
 $x < 10$

c) $-6 \cdot 6 > 2y$
 $\quad \quad 2y \leq -6 \cdot 6$
 $\quad \quad \frac{2y}{2} \leq \frac{-6 \cdot 6}{2}$
 $y \leq -3 \cdot 3$

107) $-9 < -5$

b) $6 > 2$

c) $-2 < 2$

108) a) $-y \geq 5$
 $\quad \quad \div -1 \quad \div -1$
 $y \leq -5$

b) $9 \cdot 8 > -v$
 $\quad \quad -v \leq 9 \cdot 8$
 $\quad \quad \div -1 \quad \div -1$
 $v \geq -9 \cdot 8$

c) $-c \leq -\frac{2}{3}$
 $\quad \quad \div -1 \quad \div -1$
 $c \geq \frac{2}{3}$

109) a) $-x + 5 \geq 10$
 $\quad \quad -5 \quad -5$
 $\quad \quad -x \geq 5$
 $\quad \quad -1 \quad -1$
 $x \leq -5$

b) $2.5 < 7 - c$
 $\quad \quad -7 \quad -7$
 $\quad \quad -4.5 < -c$
 $\quad \quad -c > -4.5$
 $\quad \quad \cdot -1 \quad \cdot -1$
 $c < 4.5$

c) $4x - 1 > -4$
 $\quad \quad +1 \quad +1$
 $\quad \quad 4x > -3$
 $\quad \quad \frac{4x}{4} > \frac{-3}{4}$
 $x > -\frac{3}{4}$

$$d) \frac{x}{2} + 5 \leq -1$$

$$\quad \times 2 \quad \times 2$$

$$x + 10 \leq -2$$

$$\quad -10 \quad -10$$

$$\underline{\underline{x \leq -12}}$$

$$e) 5x > 3x - 9$$

$$\quad -3x \quad -3x$$

$$\underline{2x > -9}$$

$$\quad \quad \quad \underline{\underline{x > -\frac{9}{2}}}$$

$$f) 7 - 2x \leq 9x + 8$$

$$\quad -9x \quad -9x$$

$$7 - 11x \leq 8$$

$$\quad -7 \quad -7$$

$$\underline{-11x \leq 1}$$

$$\quad -11 \quad -11$$

$$\underline{\underline{x \geq -\frac{1}{11}}}$$

$$g) 8 < 4(2x - 1)$$

$$8 < 8x - 4$$

$$\quad -8x \quad -8x$$

$$8 - 8x < -4$$

$$\quad -8 \quad -8$$

$$\underline{-8x < -12}$$

$$\quad -8 \quad -8$$

$$\underline{\underline{x > \frac{3}{2}}}$$

$$h) 9 - 2(x + 5) < 8$$

$$9 - 2x - 10 < 8$$

$$\quad -1 - 2x < 8$$

$$\quad \quad \quad +1 \quad +1$$

$$\underline{-2x < 9}$$

$$\quad -2 \quad -2$$

$$\underline{\underline{x > -\frac{9}{2}}}$$

$$i) 5(-1 + 3x) > -9(x - 9)$$

$$-5 + 15x > -9x + 81$$

$$\quad +9x \quad +9x$$

$$\quad +5 \quad +5$$

$$24x > 86$$

$$\quad \div 24 \quad \div 24$$

$$\underline{\underline{x > \frac{43}{12}}}$$

$$j) -\frac{1}{2}x^2 + 4x + 1 \geq -\frac{1}{2}x^2 - x$$

$$\quad +\frac{1}{2}x^2 \quad +\frac{1}{2}x^2$$

$$4x + 1 \geq -x$$

$$\quad +x \quad +x$$

$$5x + 1 \geq 0$$

$$\quad -1 \quad -1$$

$$\underline{5x \geq -1}$$

$$\quad \quad \quad \underline{\underline{x \geq -\frac{1}{5}}}$$

$$k) \frac{5y}{7} > 3 - \frac{y+2}{5}$$

$$\quad \times 35 \quad \times 35$$

$$25y > 105 - 7(y+2)$$

$$25y > 105 - 7y - 14$$

$$25y > 91 - 7y$$

$$\quad +7y \quad +7y$$

$$32y > 91$$

$$\quad \div 32 \quad \div 32$$

$$\underline{\underline{y > \frac{91}{32}}}$$