TRANSITION PROGRAMMES
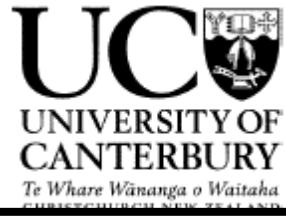# TRNS007

WORKSHEETS

PREPARATION WORKSHEETS

Worksheet One: Fractions, Decimals, and Percentages

1. Evaluate (without a calculator — use your calculator to check your answer):
   (a) $4 + 8 \div 2 - 7$
   (b) $3 - (3 - 4) \div 2$
   (c) $(4 - 2)^2 + 3 \times 2$
   (d) $-4 \div 2 \times 6 - 3 + 2$
   (e) $(23 - 14)(4 - 3 \times 2)$
   (f) $\dfrac{6 + 1}{2 - 3^2}$
   (g) $\dfrac{12 - 2(1 + 4)}{4^2 - 2 \times 7}$
   (h) $5 - \dfrac{22}{6 \times 3 - 7}$
   (i) $\dfrac{(3^3 + 3)(5 - 2^2)}{2(4 + 18 \div 3)}$
   (j) $500 \div (13 - 24 \div 8)^2$

2. State whether each of the following numbers are integer, rational or irrational numbers:

   a) -7
   (b) 3π
   (c) $\dfrac{23}{34}$
   (d) $\sqrt{3}$
   (e) $0 \cdot \dot{3}$

3. Write as simply as possible (without a calculator — use your calculator to check your answer.):

   (a) $\dfrac{16}{48}$
   (b) $\dfrac{27}{33}$
   (c) $3\dfrac{25}{30}$
   (d) $\dfrac{35}{25}$
   (e) $\dfrac{36}{24}$

4. Evaluate or simplify (without your calculator - use your calculator to check your answer).
   Leave your answer as a fraction.:
   (a) $\dfrac{1}{5} + \dfrac{3}{5}$
   (b) $\dfrac{4}{7} - \dfrac{1}{7}$
   (c) $\dfrac{2}{3} \times \dfrac{1}{5}$
   (d) $\dfrac{4}{14} \times \dfrac{28}{9}$

   (e) $\dfrac{4}{9} \div \dfrac{2}{3}$
   (f) $\dfrac{3}{8} - \dfrac{1}{9}$
   (g) $\dfrac{1}{2} + \dfrac{2}{5}$
   (h) $4 \div \dfrac{1}{2}$

   (i) $4 - \dfrac{3}{7}$
   (j) $\dfrac{2}{15} \times \dfrac{10}{16}$
   (k) $\dfrac{3}{5} + \dfrac{1}{4}$
   (l) $\dfrac{1}{2} + \dfrac{3}{16}$
   (

   m) $1\dfrac{2}{3} + 2\dfrac{1}{2}$
   (n) a third of a half
   (o) $\dfrac{12}{25} \times \dfrac{15}{28} \div \dfrac{6}{35}$
   (p) $\left(\dfrac{2}{3}\right)^3$

5. Evaluate (without a calculator — use your calculator to check your answer.):
   (a) $0 \cdot 35 \div 100$
   (b) $3 \cdot 2 - 0 \cdot 85$
   (c) $0 \cdot 7 \times 5$
   (d) $3 \cdot 5 + 0 \cdot 35$

   (e) $0 \cdot 3 \times 0 \cdot 6$
   (f) 200×0.00002

6. Write as a decimal
   (a) $\dfrac{7}{10}$
   (b) $\dfrac{4}{5}$
   (c) $\dfrac{318}{1000}$
   (d) $\dfrac{54321}{10000}$

   (e) $\dfrac{458}{100}$
   (f) $\dfrac{20}{1000}$
   (g) $3\dfrac{6}{100}$
   (h) $7\dfrac{18}{1000}$

7. Write in order (from smallest to largest)
   (a) 3.1,   3.01,   3,   3.10009,   3.0999   (b) $0 \cdot 235678$, $0 \cdot 24$, $0 \cdot 2$, $0 \cdot 024$, $0 \cdot 3$, $0 \cdot 236$

   (c) $\dfrac{8}{11}$, $\dfrac{3}{4}$,   71%,   0.72   (d) 66%, $\dfrac{2}{3}$,   0.669, $\dfrac{666}{1000}$

8. Write the following (i) as a fraction; (ii) as a decimal:
   (a) 75%   (b) 36%   (c) 150%   (d) 0.5%   (e) 3000%

9. Write the following as a percentage:
   (a) 0.654   (b) $\dfrac{8}{12}$ (c) 0.0054   (d) 17.832   (e) 1000

10. Evaluate the following:
   (a) 85% of 360 (b) 3% of 5.4   (c) 110% of 5   (d) 32.5% of 76.2   (e) ½% of ¼

11. (a) Increase 40 by 80%   (b) Decrease 40 by 80%   (c) Increase 0.6 by 110%

12. (a) Find the percentage profit if a house is bought for $340 000 and sold for $400 000.

    (b) Find the percentage loss if a set of golf clubs bought for $900 is sold for $750.

    (c) If a car is sold for a profit of 24%, what was the selling price if it was bought for $5000?

    (d) A carpet is advertised for sale on Trade Me. It's reserve price is $85. If it sells for $105, what is the percentage increase in the selling price over the reserve price?

    (e) If a pair of skis were sold for $249 at the ski sale. If the profit on the sale of the skis was 35%, what was the amount the skis were bought for?

Worksheet One: Fractions, Decimals, and Percentages ─ Answers

1. (a) 1; (b) 3.5; (c) 10; (d) −13; (e) −18; (f) −1; (g) 1; (h) 3; (i) 1.5; (j) 5;
2. (a) Integer; (b) Irrational; (c) Rational; (d) Irrational; (e) Rational.
3. (a) $\dfrac{1}{3}$; (b) $\dfrac{9}{11}$; (c) $3\dfrac{5}{6}$; (d) $1\dfrac{2}{5}$; (e) $1\dfrac{1}{2}$;
4. (a) $\dfrac{4}{5}$; (b) $\dfrac{3}{7}$; (c) $\dfrac{2}{15}$; (d) $\dfrac{8}{9}$; (e) $\dfrac{2}{3}$; (f) $\dfrac{19}{72}$; (g) $\dfrac{9}{10}$; (h) 8 ; (i) $3\dfrac{4}{7}$; (j) $\dfrac{1}{12}$
   (k) $\dfrac{17}{20}$; (l) $\dfrac{11}{16}$; (m) $4\dfrac{1}{6}$; (n) $\dfrac{1}{6}$; (o) $1\dfrac{1}{2}$; (p) $\dfrac{8}{27}$;
5. (a) 0.0035; (b) 2.35; (c) 3.5; (d) 3.85; (e) 0.18; (f) 0.004;
6. (a) 0.7; (b) 0.8; (c) 0.318; (d) 5.4321; (e) 4.58; (f) 0.02; (g) 3.06; (h) 7.018
7. (a) 3, 3.01, 3.0999, 3.1, 3.10009; (b) 0.024, 0.2, 0.235678, 0.236, 0.24, 0.3;
   (c) 71%, 0.72, $\dfrac{8}{11}$, $\dfrac{3}{4}$; (d) 66%, $\dfrac{666}{1000}$; $\dfrac{2}{3}$, 0.669;
8. (a) $\dfrac{3}{4}$, 0.75; (b) $\dfrac{9}{25}$, 0.36;; (c) $1\dfrac{1}{2}$, 1.5; (d) $\dfrac{1}{200}$, 0.005; (e) 30, 30;
9. (a) 65.4%; (b) $66\dfrac{2}{3}$%; (c) 0.54%; (d)1783.2%; (e) 100 000%;
10. (a) 306; (b) 0.162; (c) 5.5; (d) 24.765; (e) 0.00125;
11. (a) 72; (b) 8; (c) 1.26;
12. (a) 17.65%; (b) 16.7%; (c) $6200; (d) 23.5%; (e) $184.44;

Worksheet Two: Rounding Numbers, Standard Form, and Exponents

1.   Complete the following table:

Calculator Answer	round to 4 SF	round to 3 DP	round to 2 SF
1.634791			
0.000075289			
534.23469			
1389.54328			
2.539790094			
31206000			
4699.9948			

2.   Complete the table converting numbers to and from standard form:

	Number	Standard Form
	23 456	2.3×10^4
(a)	7300	
(b)		6×10^2
(c)	0.0005	
(d)		3.4×10^{-3}
(e)	1.37	
(f)		8.099×10^1
(g)	0.00000768	
(h)		9.6223×10^{-1}
(i)	1000	
(j)		4.03786×10^4
(k)	500 million	

3.   Write the following as a single number (do not use a calculator to find the number ─ use your calculator to check your answer.):

(a) $3^6 \times 3^{-2}$ (b) $5^3 \div 5^5$ (c) 4^{-2} (d) $\dfrac{2^7 \times 2^2}{2^4}$ (e) $\left(\dfrac{2}{5}\right)^2$

(f) $\left(\dfrac{3}{2}\right)^{-3}$ (g) $4^{\frac{1}{2}} \times 4^{-\frac{1}{2}}$ (h) $2^{0.6} \times 2^{4.1} \div 2^{2.7}$ (i) $(3^2)^3$ (j) $8^{\frac{-2}{3}}$

4.   The fraction $\dfrac{22}{7}$ is often used as an approximation for π.

To how many significant figures is this accurate?

Worksheet Two: Rounding Numbers, Standard Form and Exponents ─ Answers

1.

Calculator Answer	round to 4 SF	round to 3 DP	round to 2 SF
1.634791	1.635	1.635	1.6
0.000075289	0.00007529	0.000	0.000075
534.23469	534.2	534.235	530
1389.54328	1390	1389. 543	1400
2.539790094	2.540	2.540	2.5
31 206 000	31 210 000	31 206 000	31 000 000
4699.9948	4700	4699.995	4700

2.

	Number	Standard Form
	23 456	$\mathbf{2.3 \times 10^4}$
(a)	7300	7.3×10^3
(b)	600	6×10^2
(c)	0.0005	5×10^{-4}
(d)	0.0034	3.4×10^{-3}
(e)	1.37	1.37×10^0
(f)	80.99	8.099×10^1
(g)	0.00000768	7.68×10^{-6}
(h)	0.96223	9.6223×10^{-1}
(i)	1000	1×10^3
(j)	40378.6	4.03786×10^4
(k)	500 million	5×10^8

3. (a) 81; (b) $\dfrac{1}{25}$; (c) $\dfrac{1}{16}$; (d) 32; (e) $\dfrac{4}{25}$; (f) $\dfrac{8}{27}$; (g) 1; (h) 4; (i) 729; (j) $\dfrac{1}{4}$;

4. 3 SF (3.14).

Worksheet Three: Substitution

1. (a) Evaluate $3x^2 y$ (i) when $x = 4$ and $y = 2$; and (ii) when $x = \frac{1}{2}$ and $y = -8$

   (b) Evaluate $5x + 13y - 2z$ when $x = 6$, $y = -1$, and $z = -3$

   (c) Evaluate (i) $3x^2$ and (ii) $(3x)^2$ when $x = 5$

   (d) Evaluate $3x^2 - 4x + 1$ when $x = -4$

2. The formula $s = ut + \frac{1}{2}at^2$ is used in mechanics.
   Find s, when $u = 27$, $t = 6.3$, and $a = 0.025$

3. If $m = 10$, $n = -4$, and $p = \frac{1}{2}$, calculate each of the following expressions:
   (a) $p - n$ (b) $mnp + (np)^2$ (c) $5(m + n)(6p - n)$

   (d) $4(np + 3m)^2$ (e) $\dfrac{2m - 3p}{p^2}$

4. Evaluate the following when $x = -3$:

   (a) $\dfrac{x^2}{3}$;   (b) $(-x)^2$;   (c) $-x^2$;   (d) $3x^2$;   (e) $-2x^2$;   (f) $(-2x)^2$;   (g) $-\left(\dfrac{x}{3}\right)^2$

5. In business calculations an investment earning 'compound interest' is given by the formula:
   $A = P(1 + r)^n$ .Calculate A when $P = \$4500$, $r = 0.0425$, and $n = 11$

6. The conversion of temperature in degrees Fahrenheit to degrees Centigrade is given by the formula:
   $C = \frac{5}{9}(F - 32)$.
   (a) Find C when $F = 100°$;
   (b) Show that the boiling point of water of 100°C is the same as 212°F.

7. The period (time of swing) of a pendulum (in seconds) is given by: $T = 2\pi \sqrt{\dfrac{l}{g}}$.

   Find the value of T when $l = 2.63$ metres, and $g = 9.8$ m/sec^2

8. If $M = 2(ac)^2 - 3ab$, find M when $a = 9$, $b = -1$, and $c = -3$

Worksheet Three: Substitution — Answers

1. (a) 96; −6; (b) 23; (c) 75; 225; (d) 65;
2. 170.6
3. (a) 4.5; (b) −16; (c) 210; (d) 3136; (e) 74;
4. (a) 3; (b) 9; (c) −9; (d) 27; (e) −18; (f) 36; (g) −1;
5. $ 7112.94;
6. (a) 37.8°C;
7. 3.25 seconds;
8. 1485;

Worksheet Four: Basic Algebra

1. Simplify the following expressions:

    (a) $3x + 8x$ (b) $5x - 2x$ (c) $-3x - 8x$ (d) $3x - 2 - 8x$
    (e) $3x + 8x^2 - 4x + 2$ (f) $5xy - 2x - xy$ (g) $3a + b - 2a - 7b$

2. Simplify the following expressions:

    $(a)\ 3x \times 5x$ $(b)\ 3x^2 \times (-4x)$ $(c)\ (x^3)^3 \times x$ $(d)\ (3x)^2 \times 2x$ $(e)\ \dfrac{8ab}{2a}$ $(f)\ \dfrac{8a^3b}{4ab^2}$

3. Expand the following:

    $(a)\ 3(5x - 2)$ $(b)\ -2x(x^2 - 4x)$ $(c)\ x(2x - 1) - 2x(5 - x)$ $(d)\ (x + 2)(x + 3)$
    $(e)\ (3x - 5)(3x + 5)$ $(f)\ (3x + 1)^2$ $(g)\ (5x - y)^2$ $(h)\ (a + b)(a - b)$ $(i)\ (a - b)^2$

4. Factorise the following expressions:

    $(a)\ 6x + 4$ $(b)\ 2x^2 - 4x$ $(c)\ -5x - 35x^2$ $(d)\ 3abc - 6ac^2$ $(e)\ x^2 + 5x + 6$
    $(f)\ x^2 - x - 6$ $(g)\ x^2 - 9$ $(h)\ x^2 - 10x + 25$ $(i)\ x^2 + 2x + 1$ $(j)\ x^2 - x - 42$

Worksheet Four: Basic Algebra-Answers

1. $(a)\ 11x$ $(b)\ 3x$ $(c)\ -11x$ $(d)\ -5x - 2$ $(e)\ 8x^2 - x + 2$ $(f)\ 4xy - 2x$ $(g)\ a - 6b$

2    $(a)\ 15x^2$ $(b)\ -12x^3$ $(c)\ x^{10}$ $(d)\ 18x^3$ $(e)\ 4b$ $(f)\ \dfrac{2a^2}{b}$

3. $(a)\ 15x - 6$ $(b)\ -2x^3 + 8x^2$ $(c)\ 4x^2 - 11x$ $(d)\ x^2 + 5x + 6$ $(e)\ 9x^2 - 25$
    $(f)\ 9x^2 + 6x + 1$ $(g)\ 25x^2 - 10xy + y^2$ $(h)\ a^2 - b^2$ $(i)\ a^2 - 2ab + b^2$

4. $(a)\ 2(3x + 2)$ $(b)\ 2x(x - 2)$ $(c)\ -5x(1 + 7x)$ $(d)\ 3ac(b - 2c)$ $(e)\ (x + 2)(x + 3)$
    $(f)\ (x - 3)(x + 2)$ $(g)\ (x + 3)(x - 3)$ $(h)\ (x - 5)^2$ $(i)\ (x + 1)^2$ $(j)\ (x - 7)(x + 6)$

Worksheet Five: Solving simple equations

1. Verify that the given values of x satisfy the given equations:
   (a) $x = 1$ satisfies $4x - 3 = 1$
   (b) $x = -3$ satisfies $6x + 20 = 2$
   (c) $x = 4$ satisfies $2x - 5 = 5x - 17$
   (d) $x = -\frac{3}{4}$ satisfies $4 - 12x = 13$

2. Solve the following equations:
   (a) $m - 3 = 12$
   (b) $5x = 35$
   (c) $\dfrac{k}{3} = 15$
   (d) $21 + a = 15$
   (e) $3t + 11 = 35$
   (f) $2n = n + 7$
   (g) $4y + 2 = y + 12$
   (h) $7d + 2 = 4d + 26$
   (i) $12z - 5 = 7z - 15$
   (j) $3v - 16 = 5v$
   (k) $\dfrac{3}{5}b + 17 = b$
   (l) $\dfrac{2x + 1}{3} = 5$
   (m) $4x + 14 = -x + 7$
   (n) $\dfrac{h + 2}{5} = \dfrac{4h}{3}$
   (o) $\dfrac{2}{q + 3} = \dfrac{5}{3q}$
   (p) $2(3x + 4) = 4(x + 5)$
   (q) $5(2u - 1) = 3(2 - u)$
   (r) $6(1 - s) = 4s$

3. (a) The velocity of a projectile, v, (in m/sec), is given by $v = u + at$
   Find a, if $v = 30$ m/s, $u = 12$m/s, and $t = 2.5$ sec.

   (b) The horizontal distance a projectile travels is given by $s = ut + \frac{1}{2}at^2$
   Find u, if $s = 152$ m, $t = 8$ sec, and $a = 4$ m/sec^2.

4. A formula used in statistics is $z = \dfrac{x - \mu}{\sigma}$
   (a) Find z, if $x = 75.5$, $\mu = 76$, and $\sigma = 2.77$;
   (b) Find x, if $z = 1.645$, $\mu = 21$, and $\sigma = 4.1$
   (c) Find μ, if $z = 0.096$, $x = 221$, and $\sigma = 47$

5. Solve the equations:
   (a) $3(2x - 1) = 4 + 6x$
   (b) $12 - 24x = -6(4x - 2)$

6. Find a, if $a + 2a + 3a + 4a = 1$

7. Solve the following quadratic equations:
   (a) $2x^2 - 4x = 0$ (b) $-5x - 35x^2 = 0$ (c) $x^2 + 5x + 6 = 0$ (d) $x^2 - x - 6 = 0$
   (e) $x^2 - 9 = 0$ (f) $x^2 - 10x + 25 = 0$ (g) $x^2 + 2x + 1 = 0$ (h) $x^2 - x - 42$

Worksheet Five: Solving simple equations — Answers

2. (a) 15; (b) 7; (c) 45; (d) −6; (e) 8; (f) 7; (g) $3\frac{1}{3}$; (h) 8; (i) −2; (j) −8;
   (k) 42.5; (l) 7; (m) −1.4; (n) $\frac{6}{17}$; (o) 15; (p) 6; (q) $\frac{11}{13}$; (r) 0.6;
3. (a) 7.2 m/sec^2; (b) 3 m/sec.
4. (a) - 0.181; (b) 27.74; (c) 216.49
5. (a) no solution; (b) any number;
6. $a = 0.1$
7. (a) $x = 0$ or $x = 2$ (b) $x = 0$ or $x = -\frac{1}{7}$ (c) $x = -2$ or $x = -3$ (d) $x = -2$ or $x = 3$
   (e) $x = 3$ or $x = -3$ (f) $x = 5$ twice (g) $x = -1$ twice (h) $x = 7$ or $x = -6$