Key

Math 9 Final Exam Review

1. Put the following standard notation into scientific notation, and visa versa:

a. 33 000 000= 3.3×10^7

b. 48 000 000= 4.8×10^7

c. 0.00000088= 8.8×10^{-7}

d. 2.96×10^{-5}= 0.0000296

e. 2×10^0= 2

f. 7.2×10^4 = 72000

2. Simplify the following expressions:

a. $4^3 \times 4^5 = 4^8$

b. $9^2 \times 9 \times 9^8 = 9^{11}$

c. $(3^3)(3^{11}) = 3^{14}$

d. $\frac{10^{14}}{10^3} = 10^{11}$

e. $\frac{x^5}{x} = x^4$

f. $(6^2)^7 = 6^{14}$

g. $(3^5 \times 3)^2 \div (3^3 \times 3^2)^2$

$(3^6)^2 \div (3^5)^2 = 3^{12} \div 3^{10} = 3^2$

h. $((-3)^5)^2 = (-3)^{10}$ (or 3^{10})

i. $(-4^3)^9 = -4^{27}$

j. $\left(\frac{3}{7}\right)^2 = \frac{3^2}{7^2}$

k. $\frac{(x^4)(x^3)^5}{x^2 \times x} = \frac{x^4(x^{15})}{x^3}$

$= \frac{x^{19}}{x^3} = x^{16}$

3. Evaluate the following expressions:

l. $\frac{2^3 \times 2^4}{2^5} = \frac{2^7}{2^5} = 2^2 = 4$

m. $\left(\frac{(5^7)(5^2)}{5(5^5)}\right) = \frac{5^9}{5^6} = 5^3 = 125$

n. $11^{10} \div 11^8 = 11^2 = 121$

o. $0.5^6 \div 0.5^4 = 0.5^2 = 0.25$

p. $7^0 = 1$

q. $a^0 = 1$

r. $(-5)^2 = -5 \times -5 = 25$

s. $-9^2 = -9 \times 9 = -81$

t. $(-3^2)^2 = (-3 \times 3)^2 = (-9)^2 = 81$

u. $4^{-3} = \frac{1}{4^3} = \frac{1}{64}$

v. $\left(\frac{-3}{5}\right)^{-2} = \left(\frac{-5}{3}\right)^2 = \frac{(-5)^2}{3^2} = \frac{25}{9}$

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

$= ((-2)^2)^3 = (-2)^6$

$= 64$

x. $\left(\frac{-22^4}{-3^3(-8)^3}\right)^0 = 1$

y. $3 + 2^4 - 3 \times (2^2 - 1) =$

$3 + 16 - 3 \times (4 - 1)$

$3 + 16 - 3 \times 3 = 3 + 16 - 9 = 10$

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

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

$4^2 - 2^5$

$16 - 32$

-16

4. Convert the following:

a. **56.9m to cm** 5690cm

b. 4.19 km to dm 41900 dm

c. **9.81×10^3 mm to m** 9.81 m

d. 8hs to ms 8×10^5 ms

e. **5.69×10^{-5} kL to cL** 5.69 cL

5. Evaluate and write your final answer in reduced form:

a. $\sqrt{81} =$ 9

b. $\sqrt{400} =$ 20

c. $\sqrt{2.25} =$ 1.5

d. $\sqrt{0.64} =$ 0.8

e. $\sqrt{0.01} =$ 0.1

f. $\sqrt{\frac{64}{121}} = \frac{\sqrt{64}}{\sqrt{121}} = \frac{8}{11}$

g. $\sqrt{\frac{196}{169}} = \frac{\sqrt{196}}{\sqrt{169}} = \frac{14}{13}$

h. $\sqrt[3]{27} =$ 3

5 – Part 2) Estimate each square root to the nearest tenth using benchmarks:

a) $\sqrt{18}$

$\sqrt{16}$ $\sqrt{18}$ $\sqrt{25}$

4 5

4.2 or 4.3

b) $\sqrt{58}$

$\sqrt{49}$ $\sqrt{58}$ $\sqrt{64}$

7 8

7.6 or 7.7

c) $\sqrt{98}$

$\sqrt{81}$ $\sqrt{98}$ $\sqrt{100}$

9 10

9.9

6. Circle the rational numbers: (numbers whose decimals terminate or repeat)

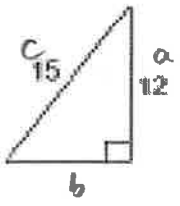
$\sqrt{324}$	π	$2.\overline{681}$	$\frac{49}{0}$	18	$-2\frac{1}{3}$
$\frac{0}{-15}$	0.3894...	$\sqrt{33}$	1.25	$-\frac{19}{5}$	-7

7. Circle the perfect squares: (numbers whose square root terminates or repeats)

256	$\frac{1}{10}$	0.169	$\frac{9}{25}$	200	$\frac{49}{100}$
$\frac{18}{36}$	1.21	$\frac{2.25}{25}$	0.09	$\frac{81}{361}$	16

8. Solve the following right triangles by finding the length of the missing side (nearest tenth). If no units are given, assume centimetres (*cm*):

a.



$a^2+b^2=c^2$

$12^2+b^2=15^2$

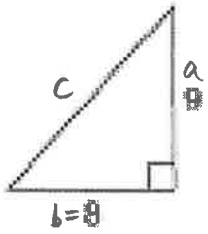
$144+b^2=225$

$-144 \quad -144$

$b^2=81$

$b=\sqrt{81}=9\text{cm}$

b.



$a^2+b^2=c^2$

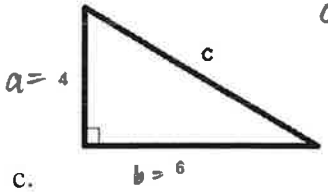
$9^2+8^2=c^2$

$81+64=c^2$

$c^2=145$

$c=\sqrt{145}=12.0\text{cm}$

c.



$4^2+6^2=c^2$

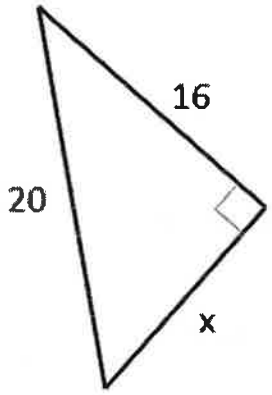
$16+36=c^2$

$c^2=52$

$c=\sqrt{52}$

$c=7.2\text{cm}$

d.



$x^2+16^2=20^2$

$x^2+256=400$

$-256 \quad -256$

$x^2=144$

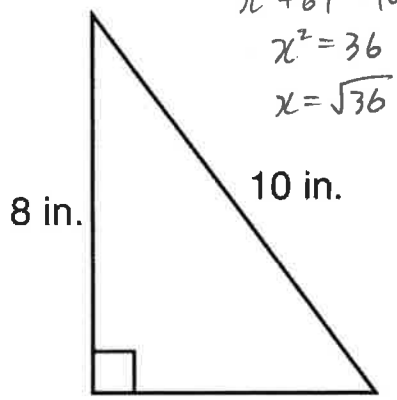
$x=\sqrt{144}=12\text{cm}$

$x^2 + 8^2 = 10^2$

$x^2 + 64 = 100$

$x^2 = 36$

$x = \sqrt{36} = 6$ in



6 in

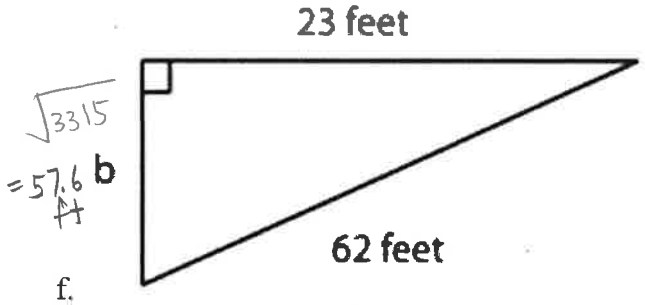
e.

$23^2 + b^2 = 62^2$

$529 + b^2 = 3844$

$b^2 = 3315$

$b = \sqrt{3315} = 57.6$ ft



$\sqrt{3315}$

$= 57.6$ b ft

f.

9. Which of the following is the TRUE statement?

a. $\frac{1}{2} < \frac{1}{3}$ b. $\frac{1}{2} > \frac{1}{3}$ c. $\frac{1}{2} \leq \frac{1}{3}$ d. $\frac{1}{2} \geq \frac{1}{3}$

10. For each of the following, list in order from least to greatest:

-0.25 0.3 $-0.\overline{6}$ $0.8\overline{3}$

a. $\frac{-1}{4}$, $\frac{3}{10}$, $-\frac{2}{3}$, $\frac{5}{6}$, -0.8

$-0.8, -\frac{2}{3}, \frac{-1}{4}, \frac{3}{10}, \frac{5}{6}$

4.29

b. 6.4, -3.2, $\frac{30}{7}$, -3.8, 2.4

$-3.8, -3.2, 2.4, \frac{30}{7}, 6.4$

-2.875 6.6 $-4.\overline{3}$

c. $-2\frac{7}{8}$, $6\frac{3}{5}$, $-2.\overline{3}$, 0.8, $-4\frac{1}{3}$

$-4\frac{1}{3}, -2\frac{7}{8}, -2.3, 0.8, 6\frac{3}{5}$

11. Write 3 rational numbers (fraction or decimal) between each pair of numbers on the number line

a. $-\frac{1}{3}$ (×16) *and* $-\frac{1}{4}$ (×12) $\quad -\frac{13}{48}, -\frac{14}{48}, -\frac{15}{48}$

$\frac{-16}{48}$ and $\frac{-12}{48}$

b. 0.46 and 0.47 $\quad$ 0.465, 0.466, 0.467, etc.

c. $\frac{1}{5}$ (×5) *and* $\frac{3}{5}$ (×5) $\quad \frac{2}{5}, \frac{6}{25}, \frac{7}{25}, \frac{8}{25}$, etc.

$\frac{5}{25}$ and $\frac{15}{25}$

12. Evaluate and write your final answer in reduced form:

a. $\frac{1}{4}+\frac{7}{20}=\frac{5}{20}+\frac{7}{20}=\frac{12}{20}=\frac{3}{5}$

b. $2\frac{4}{5}+1\frac{9}{10}=\frac{14}{5}+\frac{19}{10}=\frac{28+19}{10}=\frac{47}{10}=4\frac{7}{10}$

c. $\frac{7}{8}-\frac{5}{6}=\frac{21}{24}-\frac{20}{24}=\frac{1}{24}$

d. $3\frac{1}{6}-2\frac{2}{3}=\frac{19}{6}-\frac{16}{6}=\frac{3}{6}=\frac{1}{2}$

e. $\frac{4}{15}\times\frac{9}{1}=\frac{36}{15}=\frac{12}{5}=2\frac{2}{5}$

f. $(2\frac{1}{2})(1\frac{1}{15})=\frac{5^{1}}{2_{1}}\times\frac{16^{8}}{15_{3}}=\frac{8}{3}=2\frac{2}{3}$

g. $\frac{2}{5} \div \frac{4}{15} = \frac{2}{5} \times \frac{15}{4} = \frac{30}{20} = \frac{3}{2} = 1\frac{1}{2}$

h. $5\frac{1}{2} \div 3\frac{1}{3} = \frac{11}{2} \div \frac{10}{3} = \frac{11}{2} \times \frac{3}{10} = \frac{33}{20} = 1\frac{13}{20}$

i. $\left(\frac{5}{8} - \frac{1}{4}\right) \div \frac{2}{3} = \left(\frac{5}{8} - \frac{2}{8}\right) \times \frac{3}{2} = \frac{3}{8} \times \frac{3}{2} = \frac{9}{16}$

j. $\frac{3}{4} + \left(\frac{1}{2} \times \frac{2}{3}\right) = \frac{3}{4} + \frac{2}{6} = \frac{9}{12} + \frac{4}{12} = \frac{13}{12} = 1\frac{1}{12}$

k. $-\frac{4}{5}\left(-\frac{3}{4} + \frac{1}{3}\right) = -\frac{4}{5}\left(\frac{-9}{12} + \frac{4}{12}\right) = -\frac{4}{5}\left(\frac{-5}{12}\right) = \frac{20}{60} = \frac{1}{3}$

l. $\frac{-5}{6} + \left(\frac{-2}{3} \times \frac{3}{4}\right) = \frac{-5}{6} + \frac{-1}{2}\left(\frac{1}{4}\right) = \frac{-5}{6} + \frac{-1 \times 3}{2 \times 3} = \frac{-5}{6} + \frac{-3}{6} = \frac{-8}{6} = \frac{-4}{3}$ or $-1\frac{1}{3}$

m. $3\frac{2}{3} - \left(-1\frac{1}{3}\right) \div \frac{5}{3} + \left(-2\frac{1}{4}\right) =$

$\frac{11}{3} - \left(\frac{-4}{3}\right) \div \frac{5}{3} + \left(\frac{-9}{4}\right)$

$\frac{11}{3} - \left(\frac{-4}{3}\right) \times \frac{3}{5} + \left(\frac{-9}{4}\right)$

$\frac{11}{3} - \left(\frac{-4}{5}\right) + \left(\frac{-9}{4}\right)$

$\frac{55}{15} + \frac{12}{15} + \left(\frac{-9}{4}\right)$

$\frac{67}{15} + \left(\frac{-9}{4}\right)$

$\frac{268}{60} - \frac{135}{60}$

$= \frac{133}{60} = 2\frac{13}{60}$

13. Solve algebraically

a. $\frac{14n}{14} = \frac{105}{14}$ $n = 7.5$

b. $X + 2x + 4x = -14$ $\frac{7x}{7} = \frac{-14}{7}$ $x = -2$

c. $3(x+1) = 12$

$3x + 3 = 12$

$3x = 9$

$x = 3$

d. $\frac{2}{3}x - 5 = \frac{x}{4} - 10$ $+5$ $+5$

$\frac{2x}{3}^{(12)} = \frac{x}{4}^{(12)} - 5^{(12)}$

$8x = 3x - 60$

$-3x \quad -3x$

$\frac{5x}{5} = \frac{-60}{5}$

$x = -12$

e. $6(x-3)+6 = 2(x+13)-2$

$6x-18+6 = 2x+26-2$

$6x-12 = 2x+24$

$-2x \quad -2x$

$4x-12 = 24$

$+12 \quad +12$

$\frac{4x}{4} = \frac{36}{4}$

$x = 9$

f. $\frac{3}{-4} = \frac{m}{8}$

$-4m = 24$

$m = -6$

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

$2x - 9x = 1 - 6x$

$-7x = 1 - 6x$

$-x = 1$

$x = -1$

h. $\frac{(21)(x+1)}{3} - \frac{(21)(x+2)}{7} = 1(21)$

$7(x+1) - 3(x+2) = 21$

$7x+7-3x-6 = 21$

$4x+1 = 21$

$4x = 20$

$x = 5$

14. Write an inequality for each of the description below

a. You must be below the age of 8 or less to be able to get a free entry into the amusement park.

$age \leq 8$ $\quad a \leq 8$

b. Jack receives a grade below 75 every time of a math test.

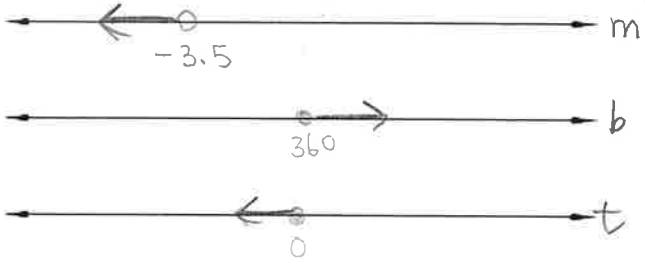
$Grade < 75$ $\quad g < 75$

15. Graph each inequality on a number line and write two possible solutions

a. $M < -3.5$

b. $b \geq 360$

c. $t \leq 0$



16. Solve and graph

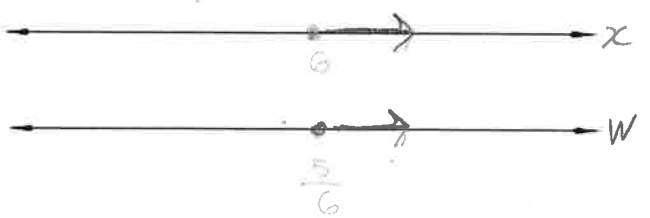
a. $3x \geq 18$

$x \geq 6$

b. $-6W - 4 \leq -9$

$\frac{-6W}{-6} \leq \frac{-5}{-6}$ FLIP!

$W \geq \frac{5}{6}$



c. $\frac{L}{6} > 0$ (6)

$L > 0$

d. $\frac{(-3)}{4}x \leq 9$ (4)

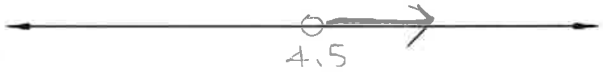
$\frac{-3x}{-3} \leq \frac{36}{-3}$ FLIP!

$x \geq -12$

e. $-2.6a + 14.6 < -5.2 + 1.8a$

$19.8 < 4.4a$

$4.5 < a$ $\quad a > 4.5$



f. $-4(x-3) - 6x > 4x - 9$

$-4x + 12 - 6x > 4x - 9$

$-10x + 12 > 4x - 9$

$+10x \quad +10x$

$12 > 14x - 9$

$+9 \quad +9$

$\frac{21}{14} > \frac{14x}{14}$

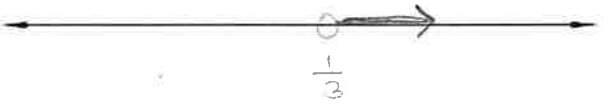
$x < \frac{3}{2}$

g. $6(y-2) > 3y - 11$

$6y - 12 > 3y - 11$

$3y > 1$

$y > \frac{1}{3}$

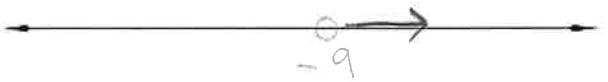


h. $2(x+3) < 3(x+5)$

$2x + 6 < 3x + 15$

$-9 < x$

$x > -9$



i. $15 - x > 2(-3 + x) + 3$

$15 - x > -6 + 2x + 3$

$-x + 15 > 2x - 3$

$18 > 3x$

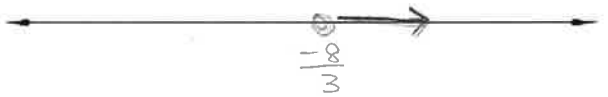
$6 > x$

$x < 6$

j. $\frac{-3b}{4} \leq 2$

$-3b \leq 8$

$b \geq \frac{-8}{3}$



k. $6 < \frac{3y}{2}$

$12 < 3y$

$4 < y$

$y > 4$

l. $\frac{8+r}{4} \geq 3$

$8+r \geq 12$

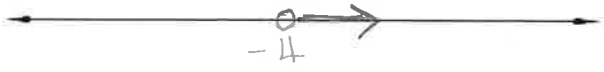
$r \geq 4$

m. $-2 < \frac{n-2}{3}$

$-6 < n-2$

$-4 < n$

$n > -4$



n. $-14 + \frac{p}{8} \geq -18$

$\frac{p}{8} \geq -4$

$p \geq -32$

o. $-3 + \frac{k}{3} > -5$

$\frac{k}{3} > -2$

$k > -6$

17. Write an equality, solve, and graph

a. Yellow Cab Taxi charges a $1.75 flat rate in addition to $0.65 per mile. Katie has no more than $10 to spend on a ride. How many miles can Katie travel?

Let x = number of miles Katie can travel

$1.75 + 0.65x \leq 10$

$0.65x \leq 8.25$

$x \leq 12.69$

$\therefore$ Katie can travel up to 12.69 miles

b. Lodge house A charges $70 plus $10 per day, lodge B charges $50 plus $15 per day. How many days can you stay at lodge house B to be less expensive than lodge house A?

Let x = number of days you stay

$70 + 10x > 50 + 15x$

$20 > 5x$

$4 > x$

$x < 4$

$\therefore$ lodge house B is less expensive for any stay less than 4 days.

18. Determine the degree of each expression:

a. $3xy^2$ degree = 3

b. 17 degree = 0

c. $15ab^3c^5$ degree = 9

d. $7x + 2y$ degree = 1

e. $-2x^3 + 4x - 11$ degree = 3

f. $8cd^4 - c^5 + 4d^4$ degree = 5

g. $-xy + 7 - 9x^2y^2 + y^3$ degree = 4

19. Rewrite in descending order of x, and give the degree of ***x***:

a. $13 + x - 4x^4 - 9x^2$ $-4x^4 - 9x^2 + x + 13$, degree = 4

b. $-3x^3y^2 + 5x^4 - x - 2 - 9x^2y$ $5x^4 - 3x^3y^2 - 9x^2y - x - 2$, degree = 4

20. Rewrite in ascending order of x:

a. $8x^5 - 3x^2 + x - x^7$ $x - 3x^2 + 8x^5 - x^7$

b. $-6xy^2 + x^4 - 1 - x^2y + 7x^3y^2$ $-1 - 6xy^2 - x^2y + 7x^3y^2 + x^4$

21. Simplify the following expressions:

a. $3a^2 + 5a - 9a^2 = -6a^2 + 5a$

b. $-10b^2 + 5b - 2b^2 - 3b =$
$-12b^2 + 2b$

c. $-4w^2z - 3z^3 + 2 - 3w^2z - 11 =$
$-3z^3 - 7w^2z - 9$

d. $9m - 4m + 2m + m$
$8m$

e. $(-11s-12t)+(-3s+9t)=$

$-11s-12t-3s+9t$

$-14s-3t$

f. $(7x-y)-(9x+5y)=$

$7x-y-9x-5y$

$-2x-6y$

g. $5a-6y-(7a-10y)=$

$5a-6y-7a+10y = -2a+4y$

h. $(8d^2+9d-13)-(d^2+11d-5)=$

$8d^2+9d-13-d^2-11d+5$

$7d^2-2d-8$

22. Expand and Simplify

a. $a^6 \times a^7 = a^{13}$

b. $2x^2y(-5xy) = -10x^3y^2$

c. $-3(x^2+x-8)-x(x+2) = -3x^2-3x+24-x^2-2x$

$= -4x^2-5x+24$

d. $(x+2y)(3x-4y+5) = 3x^2-4xy+5x+6xy-8y^2+10y$

$= 3x^2+2xy+5x-8y^2+10y$

e. $(x^3yz^2)^2 = x^6y^2z^4$

f. $(-2x^3x^4z^2)^3 = (-2x^7z^2)^3 = (-2)^3x^{21}z^6 = -8x^{21}z^6$

g. $(-2a^2b^3c^2)^2(ab^2)^3 = [(-2)^2a^4b^6c^4][a^3b^6] = 4a^7b^{12}c^4$

h. $\left(\frac{2a^2c^2}{3b}\right)^2 = \frac{2^2a^4c^4}{3^2b^2} = \frac{4a^4c^4}{9b^2}$

i. $\frac{6a^6b^4c^2}{3a^4b^3c^2} = 2a^2b$

j. $\frac{24x^5b^2c}{-8xbc} = -3x^4b$

k. $\dfrac{8x^3b^2c^2}{32x^2b^4c^3} = \dfrac{1}{4}xb^{-2}c^{-1} = \dfrac{x}{4b^2c}$

l. $\dfrac{8abc+6bc}{2c} = 4ab+3b$

m. $\dfrac{9x^5+9x^4+45x^3}{9x^2} = x^3+x^2+5x$

n. $\dfrac{9n^3+18n^4-9n^2}{9n^2} = n+2n^2-1$

o. $\dfrac{12m^3y^4-8m^2y^5+16m^4y}{4m^2y} = 3my^3-2y^4+4m^2$

23. Simplify the following expressions:

a. $3x(4x^2) = 12x^3$

b. $(-10y)(7x) = -70xy$

c. $(3^2a^2b^2)(-7ab^3) = -63a^3b^5$

d. $-8m^2n(2^3m^2n^3) = -64m^4n^4$

e. $x(x+1) = x^2+x$

f. $-5k(k-6) = -5k^2+30k$

g. $-3(b^2+b-1) = -3b^2-3b+3$

h. $-xy(3x^2+2xy-2y^3) = -3x^3y-2x^2y^2+2xy^4$

i. $-7p^2(5p^3+8p-11) = -35p^5-56p^3+77p^2$

j. $4x(-x^2-x+7)+3x = -4x^3-4x^2+28x+3x = -4x^3-4x^2+31x$

k. $5z(z-10)-8z(z+4) = 5z^2-50z-8z^2-32z = -3z^2-82z$

l. $-x^3(x-2)+3x(x^3+1)-5x = -x^4+2x^3+3x^4+3x-5x$
$= 2x^4+2x^3-2x$

m. $8t(t-4)-3t(t+1)+t(t-9) = 8t^2-32t-3t^2-3t+t^2-9t$
$= 6t^2-44t$

n. $-6r(r-5)+8(r-3)-4(r^2-2) = -6r^2+30r+8r-24-4r^2+8$
$= -10r^2+38r-16$

o. $-8(x^2-x)+5(x^2)-3x(10+2x) = -8x^2+8x+5x^2-30x-6x^2$
$-9x^2-22x$

p. $3x(7-x)-6(x^2-3x)+8x^2 = 21x-3x^2-6x^2+18x+8x^2$
$= -x^2+39x$

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

r. $\left(\frac{-35x^2}{7x}\right) = -5x$

s. $\frac{18a^2b^2}{-6ab} = -3ab$

t. $\left(\frac{-72m^2np^5}{-8mnp^3}\right) = 9mp^2$

u. $\frac{4x^2+3x}{x} = 4x+3$

v. $\frac{5s^3-15s^2+25s}{-5s} = -s^2+3s-5$

w. $\frac{18b^3-27b^2+9}{-9} = -2b^3+3b^2-1$

x. $\frac{-24a^2b+12ab-20ab^2}{4ab} = -6a+3-5b$

24. Write the linear equation corresponding to each table of values below:

X	Y
-2	-2
-1	0
0	2
1	4
2	6

a. $y = 2x + 2$

X	Y
-1	6
0	2
1	-2
2	-6
3	-10

b. $y = -4x + 2$

X	Y
-3	15
-2	10
-1	5
0	0
1	-5

c. $y = -5x$

X	Y
0	-7
1	-10
2	-13
3	-16
4	-19

d. $y = -3x - 7$

X	Y
-2	3
-1	3.5
0	4
1	4.5
2	5

e. $y = \frac{1}{2}x + 4$

X	Y
1	-4
2	1
3	6
4	11
5	16

f. $y = 5x - 9$

25. List 3 points that can be found on the line of the following linear equations:

a. $y = 2x$ i. (0, 0) ii. (1, 2) iii. (2, 4)

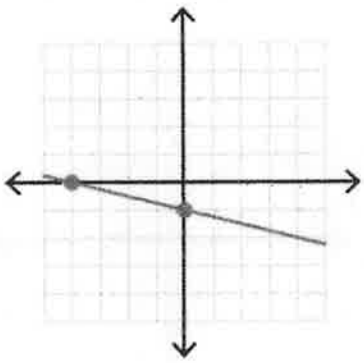
b. $y = -x + 3$ i. (0, 3) ii. (1, 2) iii. (2, 1)

c. $y = 3x - 5$ i. (0, -5) ii. (1, -2) iii. (2, 1)

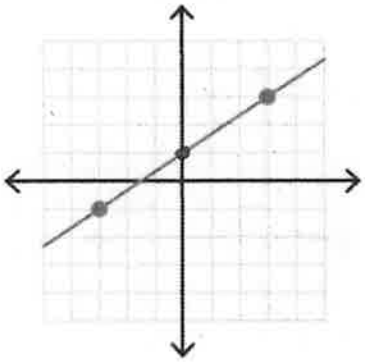
d. $y = \frac{1}{2}x + 1$ i. (0, 1) ii. (2, 2) iii. (4, 3)

e. $y = -\frac{1}{4}x - 6$ i. (0, -6) ii. (4, -7) iii. (8, -8)

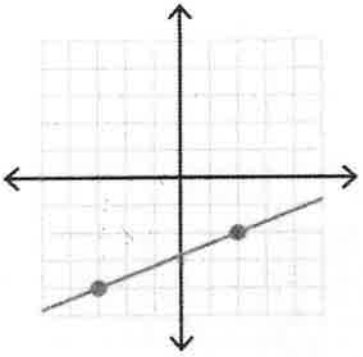
26. Determine the equation of the lines shown below:



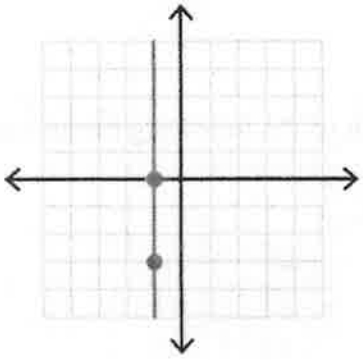
a. Equation: $y = \frac{-1}{4}x - 1$



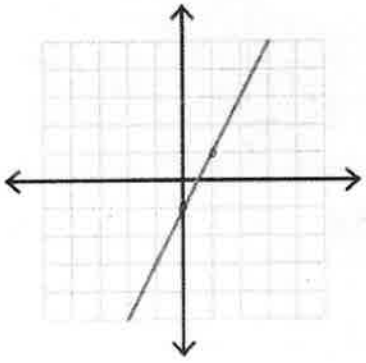
b. Equation: $y = \frac{2}{3}x + 1$



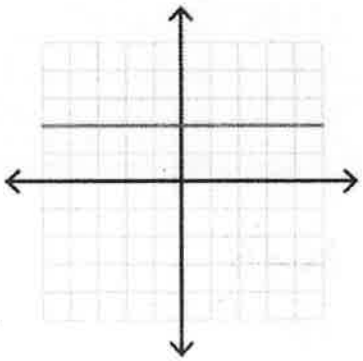
c. Equation: $y = \frac{2}{5}x - \frac{14}{5}$



d. Equation: $x = -1$

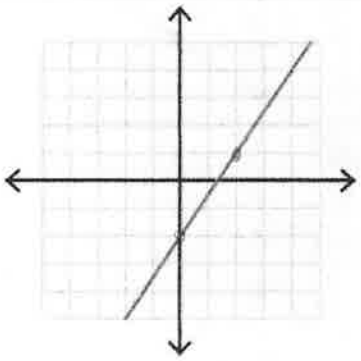


e. Equation: $y = 2x - 1$

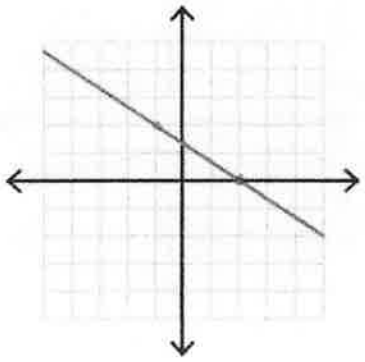


f. Equation: $y = 2$

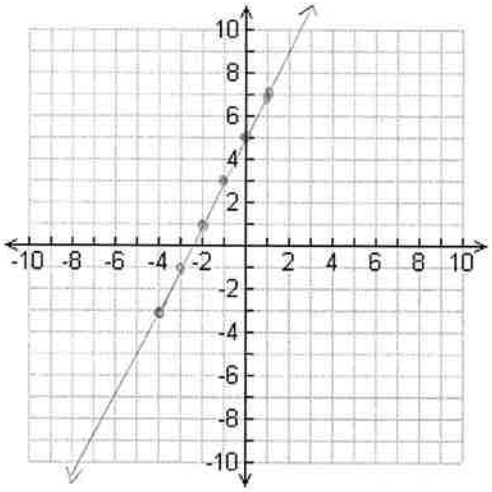
g. Equation: $y = \frac{3}{2}x - 2$



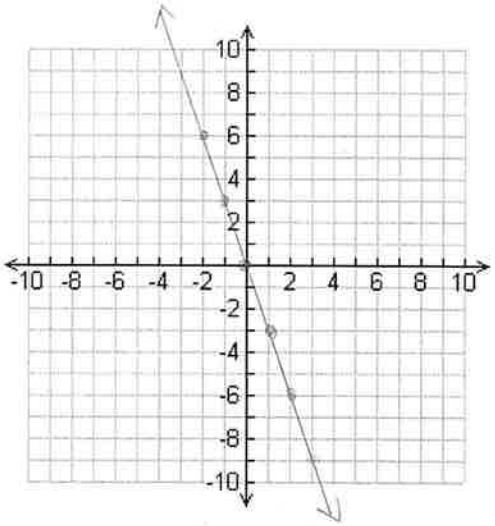
h. Equation: $y = \frac{-2}{3}x + \frac{4}{3}$



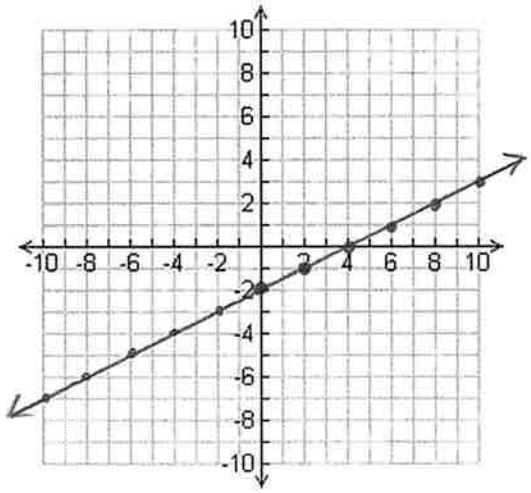
27. Graph each of the following linear equations:



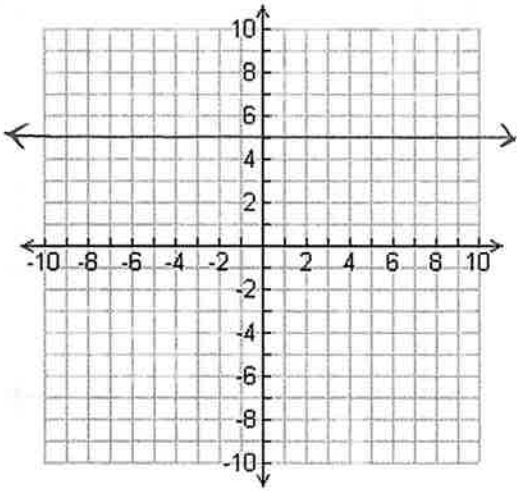
a. $y = 2x + 5$



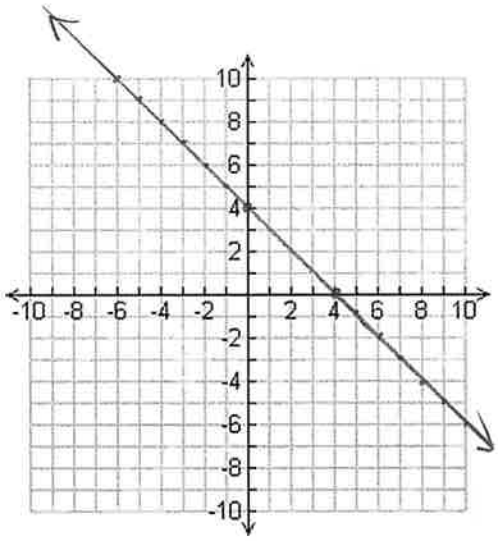
b. $y = -3x$



c. $y = \frac{1}{2}x - 2$

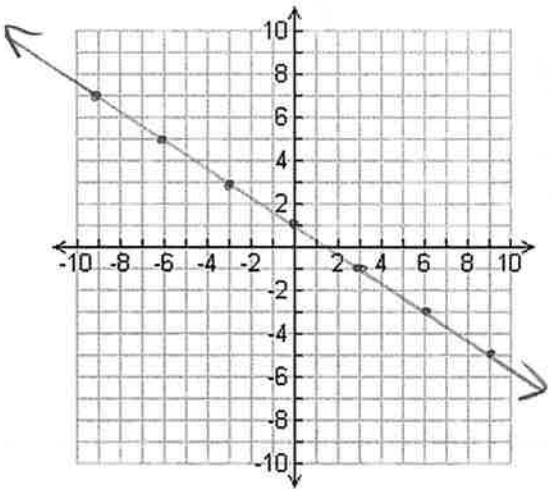


d. $y = 5$



e. $x + y = 4$

$y = -x + 4$

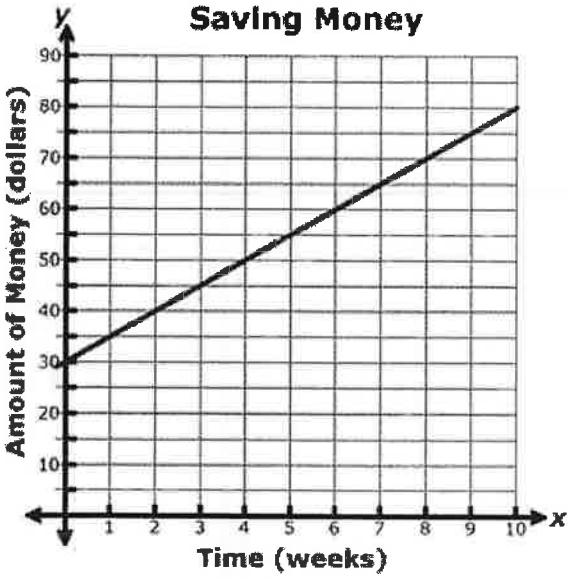


f. $2x + 3y = 3$

$3y = -2x + 3$

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

28.



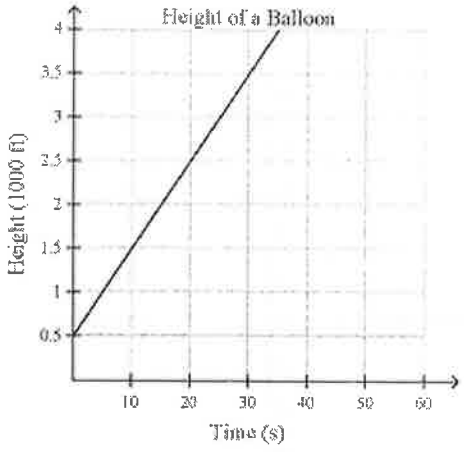
a. Determine the number of weeks to save 60 dollars. 6 weeks

b. How long do you need to save 55 dollars? 5 weeks

c. How much do you save in 10 weeks? $80

d. Make an equation for this linear relation: $y = 5x + 30$

29.



a. What's the height of the balloon at 30 seconds? 3.5 ft

b. What is the height of the balloon at 60 seconds? 6.5 ft

c. What is the height of the balloon at 2 minutes? 12.5 ft

d. Make an equation for this graph: $y = \frac{1}{10}x + \frac{1}{2}$

e. Does your equation support the answers to **b** and **c**? $6.5 = \frac{60}{10} + 0.5$ ✓ $12.5 = \frac{120}{10} + 0.5$ ✓ Yes!

30. Multiply and simplify the following:

a. $(x+1)^2 = (x+1)(x+1)$
$= x^2+x+x+1 = x^2+2x+1$

b. $(x+1)(x+2) = x^2+2x+x+2$
$= x^2+3x+2$

c. $(x+4)(x+3) = x^2+3x+4x+12$
$= x^2+7x+12$

d. $(x-4)(x-3) = x^2-3x-4x+12$
$= x^2-7x+12$

e. $(x-5)(x-1) = x^2-x-5x+5$
$= x^2-6x+5$

f. $(x-2)^2 = (x-2)(x-2) = x^2-2x-2x+4$
$= x^2-4x+4$

g. $(x-6)(x+3) = x^2+3x-6x-18$
$= x^2-3x-18$

h. $(x-2)(x+8) = x^2+8x-2x-16$
$= x^2+6x-16$

i. $(x-3)(x+3) = x^2+3x-3x-9$
$= x^2-9$

j. $(x+5)(x-4) = x^2-4x+5x-20$
$= x^2+x-20$

k. $(2x+1)(x+5) = 2x^2+10x+x+5$
$2x^2+11x+5$

l. $(3x+1)(x+2) = 3x^2+6x+x+2$
$= 3x^2+7x+2$

m. $(x-1)(2x-1) = 2x^2-x-2x+1$
$= 2x^2-3x+1$

n. $(x+7)(2x-4) = 2x^2-4x+14x-28$
$2x^2+10x-28$

o. $(x+3)(x^2+4x-3)$
$x^3+4x^2-3x+3x^2+12x-9$
x^3+7x^2+9x-9

p. $(x-7)(x^2+10x-11)$
$x^3+10x^2-11x-7x^2-70x+77$
$x^3+3x^2-81x+77$

q. $(3x+2)(5x^2-4x+1)$
$15x^3-12x^2+3x+10x^2-8x+2$
$15x^3-2x^2-5x+2$

r. $(3x^2-6x-7)(3x-4)$
$9x^3-12x^2-18x^2+24x-21x+28$
$9x^3-30x^2+3x+28$

31. Find the GCF of 32, 48, and 128. 16

32. Find the GCF of each of the following groups of terms:

a. $8xy, 16xy^2$

$8xy$

b. $5m^3, 25m^2, 35mn$

$5m$

c. $5a^2c, 2ab, 10a^3b$

a

d. $75ax^2y, 225axy, 175a^4x$

$25ax$

e. $x^3y^2z^3, x^2yz^4, 2x^3y^4z^2$

x^2yz^2

f. $2xz, 5yz, 13xy^2$

1

33. Factor each of the following:

a. $2x^2 - 10x$

$2x(x-5)$

b. $-49mn + 21m^2n^2$

$-7mn(7-3mn)$

34. Factor each of the following:

a. $45x^2y - 15xy^2 - 60xy$

$15xy(3x-y-4)$

b. $3ab^3 - 5ab^2 + ab$

$ab(3b^2-5b+1)$

35. Factor each of the following trinomials, if possible:

a. $x^2 - 9x + 14$

$\times 14$
$+ -9$
$-7, -2$

$(x-7)(x-2)$

b. $x^2 - x - 56$

$\times -56$
$+ -1$
$-8, 7$

$(x-8)(x+7)$

c. $x^2 + 9x + 18$

$\times 18$
$+ 9$
$6, 3$

$(x+6)(x+3)$

d. $x^2 + 10x - 39$

$\times -39$
$+ 10$
$13, -3$

$(x+13)(x-3)$

e. $x^2 + 7x + 14$

$\times 14$
$+ 7$

cannot factor

f. $x^2 - 8x + 16$

$\times 16$
$+ -8$
$-4, -4$

$(x-4)^2$

36. For each of the following, collect like terms, then factor:

a. $x^2 - 4x + 3 + 16x + 5 + 3x^2$

$4x^2+12x+8$

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

$4(x+2)(x+1)$

b. $5x^2 - 90x - 100 - (116 - 27x + 2x^2)$

$5x^2-90x-100-116+27x-2x^2$

$3x^2-63x-216$

$3(x^2-21x-72)$

$3(x-24)(x+3)$

37. Factor each of the following, if possible:

a. $x^2 - 36$

$(x+6)(x-6)$

b. $x^2 - 9x$

$x(x-9)$

c. $2x^2 - 32$

$2(x^2-16)$

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

d. $x^2 + 4$

cannot factor

e. $x^2 - 81$

$(x+9)(x-9)$

f. $3x^2 + 27$

$3(x^2+9)$

38. Mr. Meldrum has a 40 cm by 60 cm portrait of himself hanging in the main hallway of his house.

a. He would like to enlarge this picture by a scale factor of 15 and hang it in the gymnasium at Mt. Douglas. What will be the dimensions of this new portrait?

$40 \times 15 = 600\text{cm}$

$60 \times 15 = 900\text{cm}$

$900\text{cm} \times 600\text{cm}$

b. He would also like to reduce the picture by a scale of $\frac{1}{8}$ so that his wife can have his portrait on her work desk. What will be the dimensions of this new portrait?

$40 \times \frac{1}{8} = 5\text{cm}$ $\quad 60 \times \frac{1}{8} = 7.5\text{cm}$

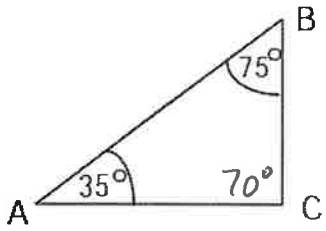
$7.5\text{cm} \times 5\text{cm}$

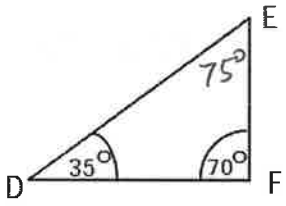
39. On a map of Vancouver Island, a ratio scale of 1:5000000 (1 cm = 5 million cm). Jason measures the distance between Victoria and Campbell River on the map and it turns out to be 4.2 cm. What is the actual distance in kilometers (km) between Victoria and Campbell River?

$4.2 \times 5000000 = 21000000\text{cm}$

$21000000 = 210\text{ km}$

40. State whether or not the following triangles are similar and support your answer.





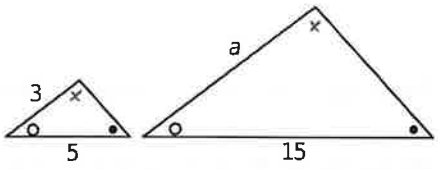
$180 - 75 - 35 = 70$

$180 - 35 - 70 = 75$

Yes, they are similar since corresponding angles are equal.

41. (i) Determine if the triangles below are similar, and explain how you know.
(ii) Find the lengths of the missing sides.

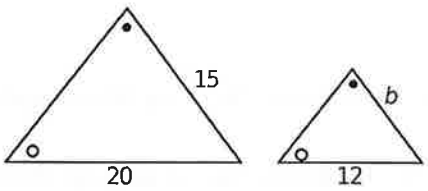
a)



If two corresponding angles are equal, the third corresponding angle is also equal so triangles are similar.

$\frac{5}{15} = \frac{3}{a} \Rightarrow a = \frac{15 \times 3}{5} = 9$

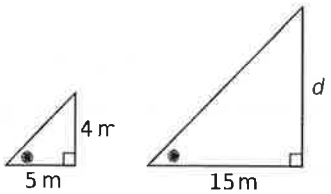
b)



Similar (same reason as part a)

$\frac{20}{12} = \frac{15}{b}$ $b = \frac{15 \times 12}{20} = 9$

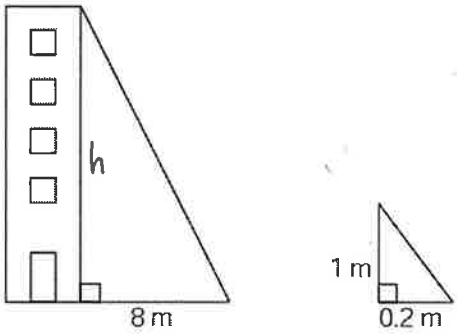
c)



Similar (same reason as part a)

$\frac{15}{5} = \frac{d}{4}$ $d = \frac{15 \times 4}{5} = 12\text{m}$

42. Assuming the two triangles are similar, find the tower's height from the given measurements below.



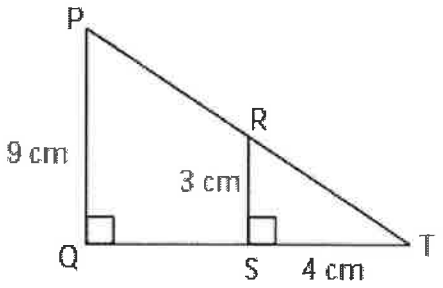
$\frac{h}{1} = \frac{8}{0.2}$ $h = \frac{8 \times 1}{0.2} = 40\text{m}$

43. Looking at the triangles in the figure on the right:

a) Are the two triangles similar?

b) What is the length of *QT*?

c) If *PT* is 15 cm, what is the length of *RT*?



a) $\angle Q = \angle S$, $\angle T = \angle T$, $\angle R = \angle P$

Yes, triangles are similar

b) $\frac{9}{3} = \frac{QT}{4}$ $QT = \frac{9 \times 4}{3} = 12\text{ cm}$

c) $\frac{15}{9} = \frac{RT}{3}$ $RT = \frac{15 \times 3}{9} = 5\text{cm}$

44. Convert the following to the nearest tenth.

a. 23 miles to feet. $23\text{ mi} \times \frac{5280\text{ ft}}{1\text{ mi}} = 121\,440\text{ ft}$

b. 120lb to kg. $120\text{ lbs} \times \frac{1\text{ kg}}{2.2\text{ lbs}} = 54.4\text{ kg}$

c. 75 inches to centimetres $75\text{ in} \times \frac{2.54\text{cm}}{1\text{ in}} = 190.5\text{cm}$

d. 46 inches to miles (there are 12 inches in one foot) $46\text{ in} \times \frac{1\text{ ft}}{12\text{ in}} \times \frac{1\text{ mi}}{5280\text{ ft}} = 7.26 \times 10^{-4}\text{ mi}$

e. Convert one million seconds to years. $1\,000\,000\text{ s} \times \frac{1\text{ min}}{60\text{ s}} \times \frac{1\text{ hr}}{60\text{ min}} \times \frac{1\text{ day}}{24\text{ hr}} \times \frac{1\text{ yr}}{365\text{ d}} = 3.17 \times 10^{-2}\text{ years}$

f. 26 yards to centimetres. $26\text{ yds} \times \frac{36\text{ in}}{1\text{ yd}} \times \frac{2.54\text{cm}}{1\text{ in}} = 2\,377.4\text{ cm}$