BLM MS–7 Math Skills BLM Answers

MS–1 Trigonometry Connections

1. $\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$, $\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$, $\tan A = \frac{\text{opposite}}{\text{adjacent}}$

2. $\sin A = \frac{a}{c}$, $\cos A = \frac{b}{c}$, $\tan A = \frac{a}{b}$

3. $\sin B = \frac{b}{c}$, $\cos A = \frac{a}{c}$, $\tan A = \frac{b}{a}$

4. $a = 32.0$ cm, A = 21.3°, B = 68.7°

5. 43°, 43 cm

6. $\sin \theta = \frac{y}{r}$, $\cos \theta = \frac{x}{r}$, $\tan \theta = \frac{y}{x}$

7. $r = \sqrt{(x^2 + y^2)}$

8. Tangent function: $y \neq 0$ since the denominator can never equal 0. Sine function: x is always in the numerator. Cosine function: y is in always in the numerator.

9. $P(x, y) = P(\cos \theta, \sin \theta)$

10. a) $r = 10.0$, $\theta = 53.1°$; $\sin 53.1° = 0.800$, $\cos 53.1° = 0.600$, $\tan 53.1° = 1.332$

b) $r = 16.6$, $\theta = 155.1°$; $\sin 155.1° = 0.421$, $\cos 155.1° = –0.907$, $\tan 155.1° = –0.464$

c) $r = 25.0$, $\theta = 286.3°$; $\sin 286.3° = –0.960$, $\cos 286.3° = 0.281$, $\tan 286.3° = –3.420$

d) $r = 5.4$, $\theta = 201.8°$, $\sin 201.8° = –0.371$, $\cos 201.8° = –0.928$, $\tan 201.8° = 0.400$

MS–2 Logical Logarithms

1. domain: $\{x \mid x \in \mathbb{R}, x > 0\}$; range: $\{y \mid y \in \mathbb{R}\}$

2. a) Examples: interest rates, financial growth or loss, radioactive decay, population growth

b) Examples: pH balance, sound intensity (measured in decibels), measurement of earthquakes (e.g., the Richter scale)

3. a) $\log_2 16 = 4$

b) $\log_{10} 100 = \frac{1}{2}$

c) $\log_5 625 = 4$

d) $\log 0.001 = –3$

e) $\log_3 (\frac{1}{9}) = –2$

f) $\log 10_1 = 0$

4. a) $3^4 = 81$

b) $10^2 = 100$

c) $10^{-1} = 0.1$

d) $81^{\frac{1}{2}} = 9$

e) $8^{-2} = \frac{1}{64}$

f) $3^4 = 81$

5. $\log_2 2 = 1$. Converted to an exponential equation, $2^1 = 2$.

6. a) $10^x = –100$. Not defined, since there is no value of x that will result in a negative.

b) $2^x = 1$. Defined.

c) $(–5)^x = 125$. Not defined, since –5 to any exponent does not equal 125.

d) $1^x = 10$. Not defined, since 1 to any exponent equals 1.

e) $0^x = 1$. Not defined, since 0 to any exponent cannot equal 1.

f) $10^1 = 10$. Defined.

g) $5^x = 0$. Not defined, since 5 to any exponent cannot equal 0.

h) $3^0 = 1$. Defined.

7. a) $\log_2 8 = 3$, $2^3 = 8$

b) $\log_4 1 = 0$, $4^0 = 1$

c) $\log 10\,000 = 4$, $10^4 = 10\,000$

d) $\log \frac{1}{100} = –2$, $10^{-2} = \frac{1}{100}$

e) $\log_{25} 5 = \frac{1}{2}$, $25^{\frac{1}{2}} = 5$

f) $\log_7 \frac{1}{49} = –2$, $7^{-2} = \frac{1}{49}$

MS–3 Working with Very Large and Very Small Numbers

1. a) 4.6×10^4

b) 5.51×10^{-1}

c) 4.8×10^{-5}

d) 7.119×10^{-3}

e) 1.8493×10^8

f) $–5.712\,04 \times 10^8$

2. a) 0.000 000 000 006 04

b) 38 700

c) 18 700 000 000

d) –0.000 000 9045

e) –0.6591

f) 241.9

3. a) $4.256 \times 10^{11} = 425\,600\,000\,000$

b) $–3.648 \times 10^{-8} = –0.000\,000\,036\,48$

c) $–6.27 \times 10^5 = –627\,000$

d) $9.501 \times 10^{-10} = 0.000\,000\,000\,9501$

4. a) 1.8×10^{-15}

b) 3.312×10^{-3}

c) $3.\overline{33} \times 10^{-7}$

d) 2.625×10^{17}

e) 5.0×10^{-7}

f) 1.728×10^{21}

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MS–4 Mathematical Symbols and Notation

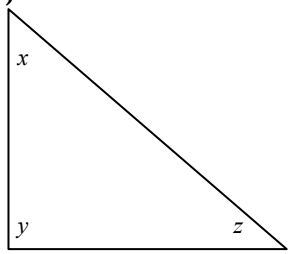
1. $\{x \mid x \in R\}$

2. Example:

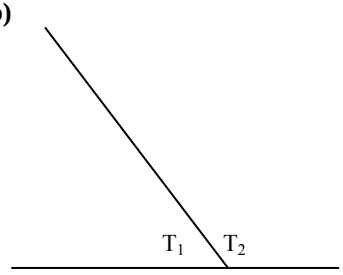
Symbolic Description	Verbal Description	Examples
a) $x = y$	x equals y	$\sqrt{49} = \pm 7$
b) $x \neq y$	x does not equal y	$4x \neq 12$ when $x = 5$
c) $x > y$	x is greater than y	$12 > 11.9$
d) $x \geq y$	x is greater than and equal to y	$5.3 \geq 5.3$
e) $x < y$	x is less than y	$0.82 < 1.05$
f) $x \leq y$	x is less than or equal to y	$\frac{1}{4} \leq \frac{1}{3}$

3. Examples:

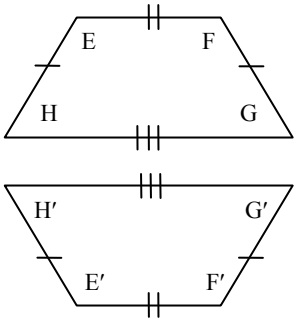
a)



b)



c)



MS–5 Calculator Keys

1. a) –0.965
b) 8427.589
c) 45.641
d) –38.387

2. a) $8\frac{5}{16}$

b) $12\frac{19}{20}$

c) $57\frac{13}{27}$

d) $19\frac{1}{36}$

e) $16\frac{2}{3}$

f) $\frac{5}{18}$

3. a) Example: $\log_3 260$ has a greater value since the base is smaller.
b) $\log 260 = 2.414\,973\,348\ldots$;
$\log_3 260 = 5.061\,550\,547\ldots$

4. a) Example: $\log_5 76$ has a greater value since the base is smaller.
b) $\log_5 76 = 2.690\,835\,917\ldots$;
$\log 76 = 1.880\,813\,592\ldots$

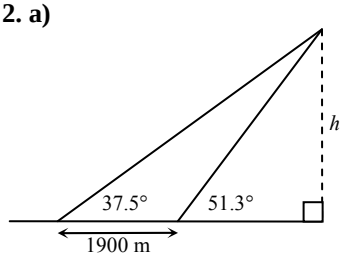
5. Example: In part g), there is no principal root because the expression is cubic.

6. a) 64 **b)** –64
c) –64 **d)** 5
e) $\frac{27}{343}$ **f)** $-\frac{1}{81}$

MS–6 Rounding, Estimating, and Using Your Calculator

1. a) Example: $23 000
b) $22 261.27

2. a)



b) 3784.3 m

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