**MATH1040 Basic Mathematics** **Practice Problems 8**

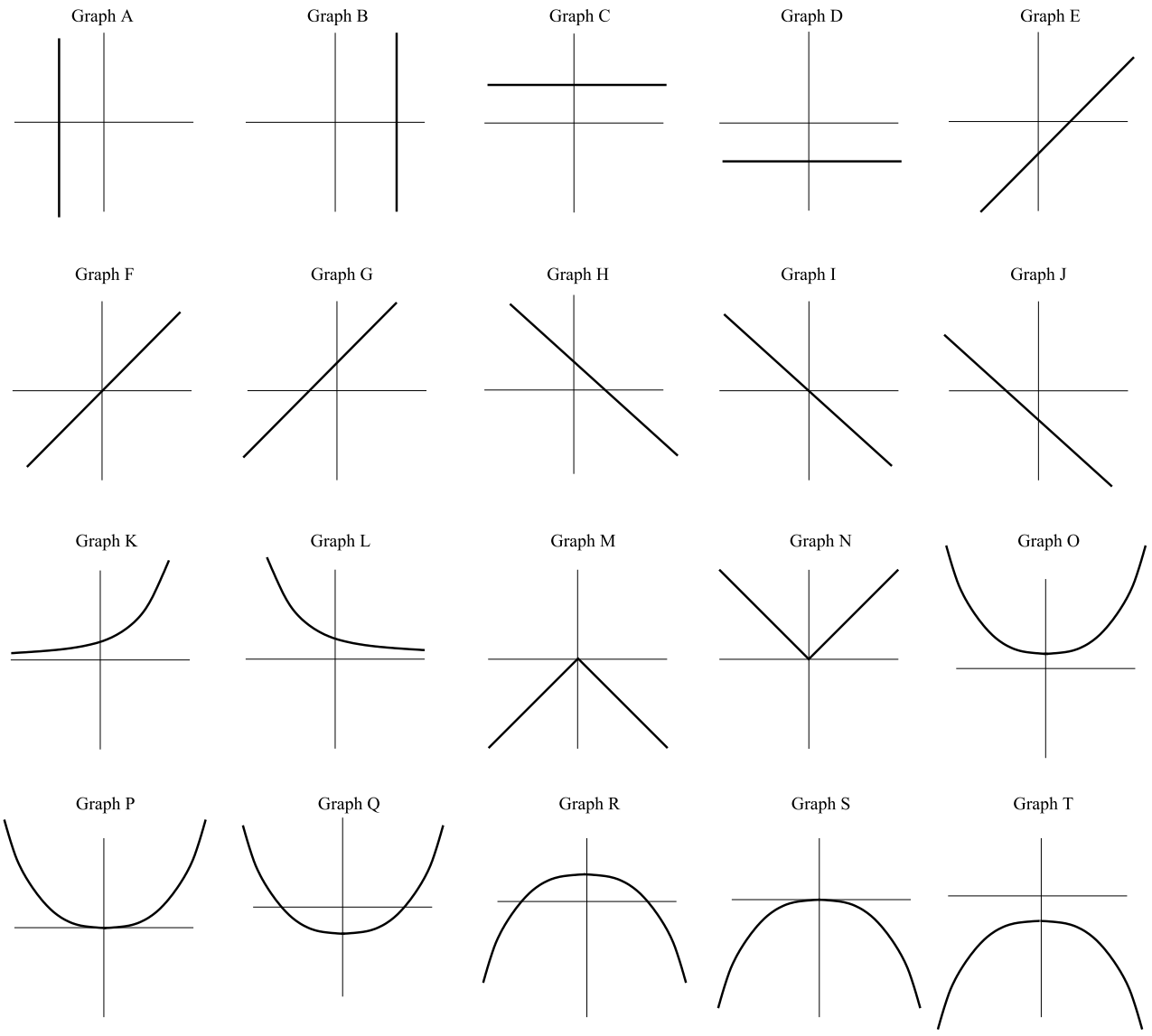


Figure 1: Graphs of various equations.

**1.** Answer each of the following questions, showing all working:

(**1**) There are eight equations given in this question and you need to match each equation with its corresponding graph. The graphs are shown in Figure 1.

**i**. $3y = 8y + 13x^2$
**ii**. $13x + 7 = 3y$
**iii**. $-3x + 2 = -10x$
**iv**. $y = e^{-5x}$
**v**. $4 = 5y + 8x + 11$
**vi**. $-10y + 11 = -11y - 3$
**vii**. $7x^2 + 4 = y$
**viii**. $y = e^{2x}$

(**2**) If \$200 is invested for 8 years at a rate of 8.0% per annum, find the final balance if interest compounds:

**i**. annually?
**ii**. every six months?
**iii**. quarterly?
**iv**. monthly?
**v**. continuously?

(**3**) Convert each of the following angles from radians to degrees:

$$\frac{11\pi}{20} \quad \frac{\pi}{10} \quad 0 \quad \frac{23\pi}{10} \quad \frac{10\pi}{9} \quad \frac{9\pi}{4} \quad 2\pi \quad 20\pi$$

(**4**) Convert each of the following angles from degrees to radians:

$$180^\circ \quad -60^\circ \quad -45^\circ \quad 198^\circ \quad 540^\circ \quad -144^\circ \quad -216^\circ \quad -1980^\circ$$

(**5**) Without using a calculator, find each of:

**i**. $\log_7 7^{10}$
**ii**. $\log_3 3$
**iii**. $\log_2 \frac{1}{8}$
**iv**. $\log_{10} 1000000$
**v**. $\log_{10} \frac{1}{10000}$
**vi**. $\ln e$
**vii**. $\ln \frac{1}{e^2}$
**viii**. $\log_{64} 4$

(**6**) On a set of axes sketch the graphs of $y = \cos x$ and $y_1 = 2\cos\frac{x}{2}$ for $x \in [-2\pi, 2\pi]$.

**2.** Answer each of the following questions, showing all working:

(**1**) There are eight equations given in this question and you need to match each equation with its corresponding graph. The graphs are shown in Figure 1.

**i**. $-11y - 7x^2 + 12 = -12y + 16x^2 + 14$
**ii**. $-15y = -3y - 16x - 3$
**iii**. $12y + 13x^2 = 14y - 16x^2 + 11$
**iv**. $12x = -8$
**v**. $y = e^{7x}$
**vi**. $13y - 14 = 15y - 4x$
**vii**. $5 = -11y - 12$
**viii**. $y = -10 \times |-11x|$

(**2**) If \$100 is invested for 4 years at a rate of 6.0% per annum, find the final balance if interest compounds:

**i**. annually?
**ii**. every six months?
**iii**. quarterly?
**iv**. monthly?
**v**. continuously?

(**3**) Convert each of the following angles from radians to degrees:

$$\frac{2\pi}{5} \quad -\frac{7\pi}{5} \quad -\frac{3\pi}{2} \quad -2\pi \quad -\pi \quad -\frac{16\pi}{15} \quad -\frac{22\pi}{9} \quad \frac{2\pi}{9}$$

(**4**) Convert each of the following angles from degrees to radians:

$$-216^\circ \quad 300^\circ \quad -120^\circ \quad 540^\circ \quad 180^\circ \quad 216^\circ \quad 420^\circ \quad -40^\circ$$

(**5**) Without using a calculator, find each of:

**i**. $\log_{15} 15^{18}$
**ii**. $\log_4 64$
**iii**. $\log_5 \frac{1}{5}$
**iv**. $\log_{10} 1000$
**v**. $\log_{10} \frac{1}{10}$
**vi**. $\ln e^8$
**vii**. $\ln \frac{1}{e^{20}}$
**viii**. $\log_{64} 4$

(**6**) On a set of axes sketch the graphs of $y = \cos x$ and $y_1 = 2\cos x$ for $x \in [-2\pi, 2\pi]$.

**3.** Answer each of the following questions, showing all working:

(**1**) There are eight equations given in this question and you need to match each equation with its corresponding graph. The graphs are shown in Figure 1.

**i**. $y = 7 \times |9x|$
**ii**. $-7y - 7 = -6y - x - 7$
**iii**. $13y - 8x^2 = 14y - 9x^2$
**iv**. $8y - 15 = 9y + 7x^2 - 16$
**v**. $2x^2 - 5 = 15y + 9x^2 - 5$
**vi**. $14y - 2x^2 - 3 = 15y + 6x^2$
**vii**. $13y = -14x$
**viii**. $y = e^{-6x}$

(**2**) If \$400 is invested for 5 years at a rate of 9.0% per annum, find the final balance if interest compounds:

**i**. annually?
**ii**. every six months?
**iii**. quarterly?
**iv**. monthly?
**v**. continuously?

(**3**) Convert each of the following angles from radians to degrees:

$$-4\pi \quad 16\pi \quad -\frac{\pi}{3} \quad 0 \quad -\frac{11\pi}{5} \quad 0 \quad \frac{9\pi}{20} \quad \frac{8\pi}{15}$$

(**4**) Convert each of the following angles from degrees to radians:

$$396^\circ \quad 135^\circ \quad 160^\circ \quad -160^\circ \quad -240^\circ \quad -1800^\circ \quad 720^\circ \quad 24^\circ$$

(**5**) Without using a calculator, find each of:

**i**. $\log_2 2^{18}$
**ii**. $\log_2 4$
**iii**. $\log_3 \frac{1}{3}$
**iv**. $\log_{10} 1000$

**v**. $\log_{10} \dfrac{1}{100000}$

**vi**. $\ln e^{-6}$

**vii**. $\ln \dfrac{1}{e^{18}}$

**viii**. $\log_9 3$

(**6**) On a set of axes sketch the graphs of $y = \cos x$ and $y_1 = 2\cos(2x)$ for $x \in [-2\pi, 2\pi]$.

**4.** Answer each of the following questions, showing all working:

(**1**) There are eight equations given in this question and you need to match each equation with its corresponding graph. The graphs are shown in Figure 1.

**i**. $-14y - x + 12 = -14y + 14$

**ii**. $-12y + 8x + 10 = -14y + 9x - 12$

**iii**. $-13y = -14y - 12x^2$

**iv**. $-3y - 2x = -2y - 2x - 4$

**v**. $-13x = -14x + 5$

**vi**. $13y - 1 = -11x^2 - 7$

**vii**. $y = -5 \times |-8x|$

**viii**. $6y - 4x + 15 = 10y - 9x + 8$

(**2**) If \$400 is invested for 4 years at a rate of 9.0% per annum, find the final balance if interest compounds:

**i**. annually?

**ii**. every six months?

**iii**. quarterly?

**iv**. monthly?

**v**. continuously?

(**3**) Convert each of the following angles from radians to degrees:

$$0 \quad \frac{7\pi}{5} \quad -14\pi \quad -\frac{2\pi}{3} \quad \frac{3\pi}{20} \quad \frac{3\pi}{20} \quad -2\pi \quad \frac{6\pi}{5}$$

(**4**) Convert each of the following angles from degrees to radians:

$$234^\circ \quad 4140^\circ \quad -270^\circ \quad -220^\circ \quad -468^\circ \quad 192^\circ \quad -84^\circ \quad -396^\circ$$

(**5**) Without using a calculator, find each of:

**i**. $\log_9 9^{15}$

**ii**. $\log_5 125$

**iii**. $\log_5 \dfrac{1}{125}$

**iv**. $\log_{10} 1000$

**v**. $\log_{10} \dfrac{1}{100000}$

**vi**. $\ln e$

**vii**. $\ln \dfrac{1}{e}$

**viii**. $\log_{27} 3$

(**6**) On a set of axes sketch the graphs of $y = \sin x$ and $y_1 = 2\sin(2x)$ for $x \in [-2\pi, 2\pi]$.

**5.** Answer each of the following questions, showing all working:

(**1**) There are eight equations given in this question and you need to match each equation with its corresponding graph. The graphs are shown in Figure 1.

**i**. $2y + x + 13 = 4y - x + 13$
**ii**. $2y - 5 = -9y + 2x^2 - 12$
**iii**. $y = 10 \times |8x|$
**iv**. $-6y - 9x = -11y - 10x$
**v**. $y = e^{5x}$
**vi**. $-10y - x - 10 = -13y - 16$
**vii**. $15y + 7x^2 = 16y + 10x^2$
**viii**. $y = e^{-6x}$

(**2**) If \$200 is invested for 1 year at a rate of 9.0% per annum, find the final balance if interest compounds:

**i**. annually?
**ii**. every six months?
**iii**. quarterly?
**iv**. monthly?
**v**. continuously?

(**3**) Convert each of the following angles from radians to degrees:

$$-\pi \quad -\frac{9\pi}{20} \quad -\frac{5\pi}{2} \quad \frac{8\pi}{3} \quad -\frac{6\pi}{5} \quad -\frac{7\pi}{9} \quad \frac{5\pi}{3} \quad -\frac{\pi}{2}$$

(**4**) Convert each of the following angles from degrees to radians:

$$-90^\circ \quad -3960^\circ \quad -90^\circ \quad -18^\circ \quad 1080^\circ \quad -3420^\circ \quad -90^\circ \quad -260^\circ$$

(**5**) Without using a calculator, find each of:

**i**. $\log_{11} 11^{19}$
**ii**. $\log_4 64$
**iii**. $\log_5 \frac{1}{25}$
**iv**. $\log_{10} 100$
**v**. $\log_{10} \frac{1}{100000}$
**vi**. $\ln e^3$
**vii**. $\ln \frac{1}{e^{12}}$
**viii**. $\log_8 2$

(**6**) On a set of axes sketch the graphs of $y = \sin x$ and $y_1 = \frac{1}{2}\sin x$ for $x \in [-2\pi, 2\pi]$.