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قطاع العمليات المدرسية
المجلس 6 النطاق6
مدرسة الطموح ح 1-2-3

United Arab Emirates

Written

Final

Exam

Grade

11 G

مديرة المدرسة / نورة براك الظاهري
مساعد مدير أكاديمي / حنان الشامسي
اعداد المعلمة : ميساء عيد ضاهر

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لا تنسونا من دعائكم ولوالدي بالرحمة

8.2

Using Statistical Experiments

Example 1

Find Probabilities

A student tossed a fair eight-sided die 200 times and recorded the results. Find the theoretical and experimental probabilities of rolling an 8.

Number on Die	Frequency
1	28
2	19
3	24
4	22
5	21
6	18
7	26
8	48

Example 1

Find Probabilities

Theoretical Probability

The theoretical probability is what is expected to happen. Because the die is fair, each side has a $\frac{1}{8}$ chance of being the result. Thus, the theoretical probability is $\frac{1}{8}$, or 12.5%.

Experimental Probability

The experimental probability is based on the data collected from the experiment. Because the die was thrown 200 times and 42 of those throws landed on 8, the experimental probability is $\frac{42}{200}$ or 21% .

8.3

Analyzing Population Data

17	Describe distributions by finding their mean and standard deviation.	Example1	P388

Mean , standard deviation and variance

الوسط والتباين والانحراف المعياري لتوزيع تكراري أو توزيع احتمالي

مثال: جد الوسط والتباين والانحراف المعياري للتوزيع:

الدرجات x	5	6	8	10
التكرار y	2	3	4	1

الطريقة:

1) إعداد النظام وإظهار عمود التكرار: MENU SETUP 6 1 SHIFT MENU SETUP ▼ 3 1

2) إدخال البيانات: 5 = 6 = 8 = 10 = ▼ ▶

2 = 3 = 4 = 1 =

3) النتائج: AC OPTN 2

$\bar{x}$ =7,25
Σx =29
Σx^2 =225
$\sigma^2 x$ =3,6875
σx =1,920286437
$s^2 x$ =4,916666667

Example 1

Find a Standard Deviation

TRACK **A coach recorded the times of each track member for a 400-meter race. Find and interpret the standard deviation of the data.**

400m Race Times (seconds)	
57.1	55.9
59.3	54.9
54.6	50.3
55.2	53.5

$\bar{x}$ =55,0625
Σx =440,5
Σx^2 =24304,25
$\sigma^2 x$ =6,15234375
σx =2,480391854
$s^2 x$ =7,03125

Example 1

Find a Standard Deviation

Step 1 Find the mean, μ.

$$\mu = \frac{57.1+59.3+54.6+55.2+55.9+54.9+50.3+53.5}{8}$$

$$= 55.1$$

The mean running time for the team is 55.1 seconds.

Example 1

Find a Standard Deviation

Step 2 Find the squares of the differences, $(\mu - x_n)^2$.

$(55.1 - 57.1)^2 = 4.00$

$(55.1 - 59.3)^2 = 17.64$

$(55.1 - 54.6)^2 = 0.25$

$(55.1 - 55.2)^2 = 0.01$

$(55.1 - 55.9)^2 = 0.64$

$(55.1 - 54.9)^2 = 0.04$

$(55.1 - 50.3)^2 = 23.04$

$(55.1 - 53.5)^2 = 2.56$

Step 3 Find the sum.

Find the sum of the values from **Step 2.**

$$4.00 + 17.64 + 0.25 + 0.01 + 0.64 + 0.04 + 23.04 + 2.56$$
$$= 48.18$$

Example 1

Find a Standard Deviation

Step 4 Divide by the number of values.

Divide the sum from **Step 3** by the number of running times.

$$\frac{48.18}{8} = 6.0225$$ This is the variance.

Step 5 Take the square root of the variance.

$$\sqrt{6.0225} \approx 2.45$$ This is the standard deviation.

$\bar{x}$	=55,0625
Σx	=440,5
Σx^2	=24304,25
$\sigma^2 x$	=6,15234375
σx	=2,480391854
$s^2 x$	=7,03125

Example 1

Find a Standard Deviation

The standard deviation is about 2.45. This is small compared with the run times, which means that the majority of the team members times are close to the mean of 55.1 seconds, and almost all of the times will likely fall within 2 standard deviations of the mean, or between 50.2 and 60.0 seconds.

9.2
Trigonometric Functions of General Angles

18	Find values of trigonometric functions of general angles.	Example 3	P427

Example 3

Evaluate Trigonometric Functions Given a Point

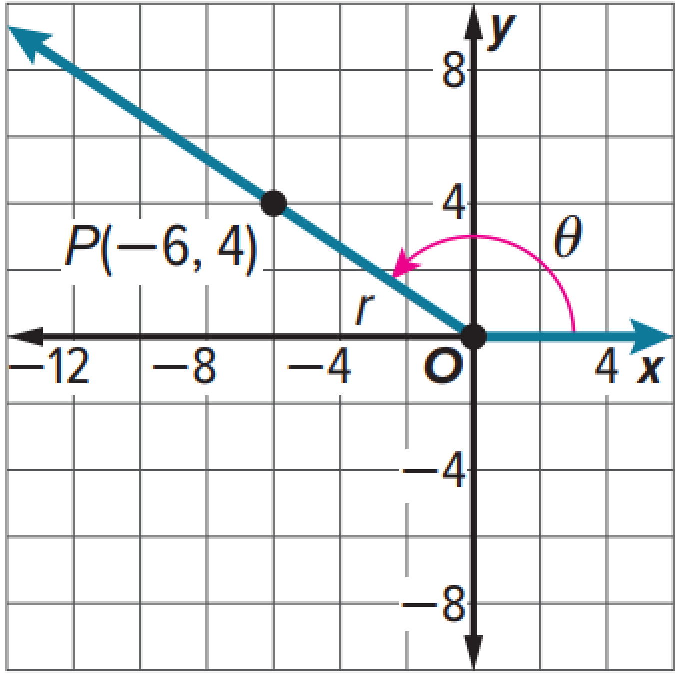
The terminal side of θ in standard position contains the point $(-6, 4)$. Find the exact values of the six trigonometric functions of θ.

Example 3

Evaluate Trigonometric Functions Given a Point

Step 1 Draw the angle.

Draw Point P to draw θ with the terminal side through $(-6, 4)$.



Step 2 Find r.

Use the Pythagorean Theorem to find the value of r.

$r = \sqrt{x^2 + y^2}$ — Pythagorean Theorem

$= \sqrt{(-6)^2 + 4^2}$ — $x = -6$ and $y = 4$

$= \sqrt{52}$ or $2\sqrt{13}$ — Simplify.

Example 3

Evaluate Trigonometric Functions Given a Point

Step 3 Find the trigonometric functions.

Use $x = -6$, $y = 4$, and $r = 2\sqrt{13}$ to write the trigonometric functions.

$$\sin\theta = \frac{y}{r} = \frac{4}{2\sqrt{13}} \text{ or } \frac{2\sqrt{13}}{13} \qquad \csc\theta = \frac{r}{y} = \frac{2\sqrt{13}}{4} \text{ or } \frac{\sqrt{13}}{2}$$

$$\cos\theta = \frac{x}{r} = \frac{-6}{2\sqrt{13}} \text{ or } \frac{-3\sqrt{13}}{13} \qquad \sec\theta = \frac{r}{x} = \frac{2\sqrt{13}}{-6} \text{ or } -\frac{\sqrt{13}}{-3}$$

$$\tan\theta = \frac{y}{x} = \frac{4}{-6} \text{ or } -\frac{2}{3} \qquad \cot\theta = \frac{x}{y} = \frac{-6}{4} \text{ or } -\frac{3}{2}$$

9.6
Graphing Other Trigonometric Functions

19	Graph horizontal and vertical translations of trigonometric graphs and find phase shifts.	Exercises (26-28)	P470

State the amplitude, period, phase shift, and vertical shift for each function. Then graph the function.

26. $y = -3 + 2\sin 2\left(\theta + \frac{\pi}{4}\right)$

The function $y = -3 + 2\sin 2\left(\theta + \frac{\pi}{4}\right)$ is in the from $y = a \sin b(x - h) + k$.

$a = 2$, so the amplitude is 2.

$b = 2$ and can be used to find the period.

$\text{period} = \frac{2\pi}{\lvert b\rvert}$	Definition of period
$= \frac{2\pi}{\lvert 2\rvert}$	$b = 2$
$= \pi$	Simplify.

So, the period is π.

$h = -\frac{\pi}{4}$, so the phase shift is $-\frac{\pi}{4}$.

$k = -3$, so the vertical shift is -3.

State the amplitude, period, phase shift, and vertical shift for each function. Then graph the function.

27. $y = 3\cos 2(\theta + 45°) + 1$

The function $y = 3\cos 2(\theta + 45°) + 1$ is in the from $y = a\cos b(x - h) + k$.

$a = 3$, so the amplitude is 3.

$b = 2$ and can be used to find the period.

$$\begin{aligned} \text{period} &= \frac{360°}{|b|} && \text{Definition of period} \\ &= \frac{360°}{|2|} && b = 2 \\ &= 180° && \text{Simplify.} \end{aligned}$$

So, the period is 180°.

$h = -45°$, so the phase shift is $-45°$.

$k = 1$, so the vertical shift is 1.

State the amplitude, period, phase shift, and vertical shift for each function. Then graph the function.

28. $y = -1 + 4\tan(\theta + \pi)$

The function $y = -1 + 4\tan(\theta + \pi)$ is in the from $y = a\tan b(x - h) + k$.

$a = 4$, so the amplitude is 4.

$b = 1$ and can be used to find the period.

$$\begin{aligned} \text{period} &= \frac{\pi}{|b|} && \text{Definition of period} \\ &= \frac{\pi}{|1|} && b = 1 \\ &= \pi && \text{Simplify.} \end{aligned}$$

So, the period is π.

$h = -\pi$, so the phase shift is $-\pi$.

$k = -1$, so the vertical shift is -1.

Find values of angle measures by using inverse trigonometric functions.

9.7

Inverse Trigonometric Functions

20	Find values of angle measures by using inverse trigonometric functions.	Example 4	P474

Example 4

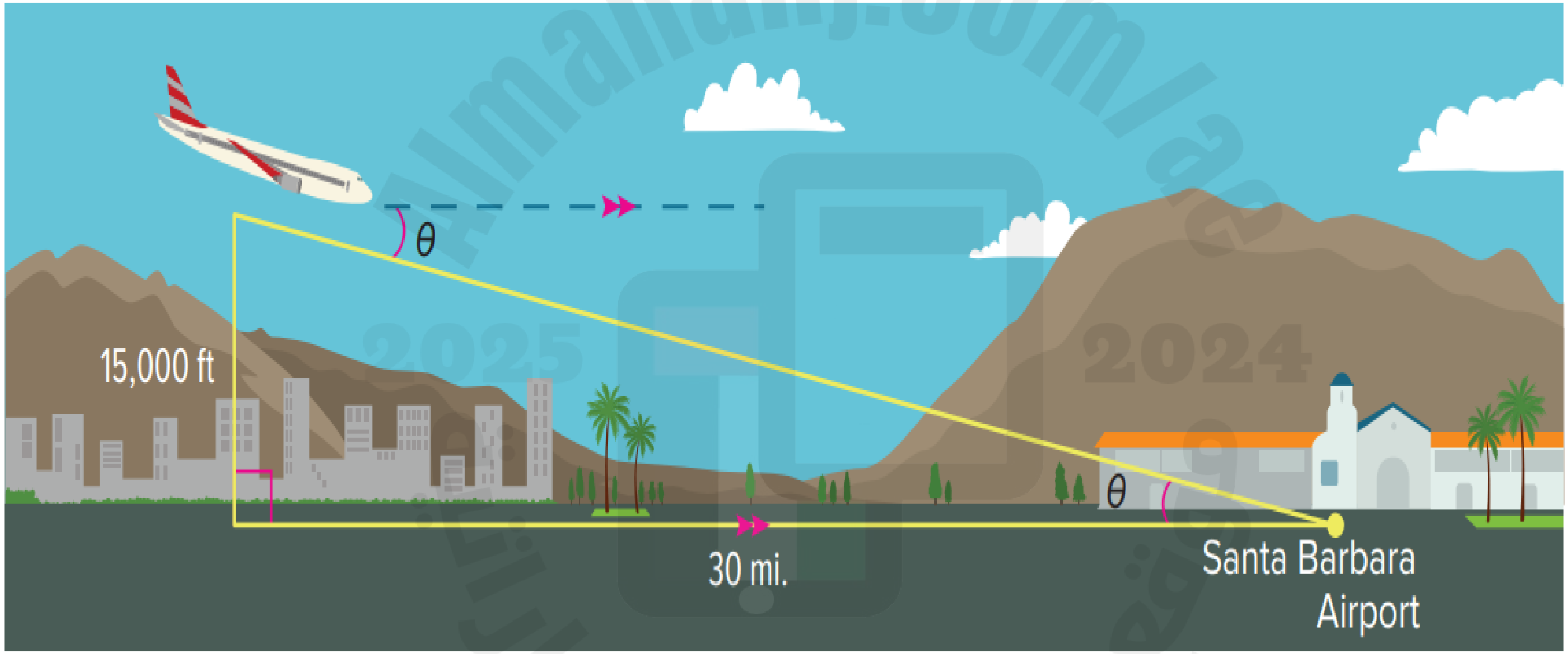
Use Inverse Trigonometric Functions

PLANES Suppose a pilot has 30 miles to land a plane at the Santa Barbara airport from an elevation of $15,000$ feet. Find the angle in degrees at which the airplane should descend.

Example 4

Use Inverse Trigonometric Functions

Step 1 Draw and label a diagram.



20	Find values of angle measures by using inverse trigonometric functions.	Example 4	P474

Example 4

Use Inverse Trigonometric Functions

Step 2 Write and solve the trigonometric equation.

$$\tan \theta = \frac{15{,}000 \text{ ft}}{30 \text{ mi}}$$ Tangent function

$$\tan \theta = \frac{15{,}000 \text{ ft}}{30 \text{ mi}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}}$$ Convert miles to feet, 1 mile $= 5280$ feet.

$$\tan \theta = \frac{15{,}000}{158{,}400}$$ Simplify.

$$\theta = \text{Tan}^{-1}\left(\frac{15{,}000}{158{,}400}\right)$$ Inverse tangent function

$$\theta \approx 5.4°$$ Simplify.

The angle of descent is about $5.4°$.