الملف تدريبات على هيكل امتحان الفصل الثالث مع الحل

روابط مواقع التواصل الاجتماعي بحسب الصف الثاني عشر العام

روابط مواد الصف الثاني عشر العام على تلغرام

الرياضيات	اللغة الانجليزية	اللغة العربية	التربية الاسلامية

المزيد من الملفات بحسب الصف الثاني عشر العام والمادة رياضيات في الفصل الثالث	
اختبار منتصف الفصل	1
اختبار تدريبي مع الحل	2
امتحان نهاية مع الحل	3
مقررات الفصل الثالث	4
مراجعة رياضيات	5

تدريبات على هيكل امتحان الصف الثاني عشر العام

الفصل الثالث

12 General - Final Exam - Term 3

2021 / 2022

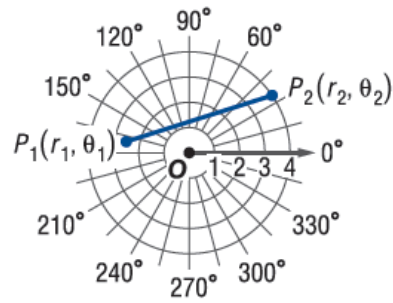| التمثيل البياني للمعادلات القطبية البسيطة. Graph simple polar equations.	Exercises (30-40)	P546 P474

KeyConcept Polar Distance Formula

If $P_1(r_1, \theta_1)$ and $P_2(r_2, \theta_2)$ are two points in the polar plane, then the distance P_1P_2 is given by

$$\sqrt{r_1^2 + r_2^2 - 2r_1r_2 \cos(\theta_2 - \theta_1)}.$$

Find the distance between each pair of points.

30. $(2, 30°), (5, 120°)$

1) 29
2) 5.39
3) 3.42
4) 6.81

31. $\left(3, \dfrac{\pi}{2}\right), \left(8, \dfrac{4\pi}{3}\right)$

1)   10.7
2)   5.60
3)   31.43
4)   114.49

32. $(6, 45°), (-3, 300°)$

1) 35.64
2) 6.03
3) 36.32
4) **5.97**

33. $\left(7, -\dfrac{\pi}{3}\right), \left(1, \dfrac{2\pi}{3}\right)$

1) **8**
2) 64
3) 6.56
4) 7.55

| التمثيل البياني للنقاط باستخدام إحداثيات القطب. | Exercises (44-49) | P546 |
| Graph points with polar coordinates. | | P474 |

Find a different pair of polar coordinates for each point such that
$0 \leq \theta \leq 180°$ or $0 \leq \theta \leq \pi$.

44. $(5, 960°)$

1)   (5 , 60)
2)   (5 , 240)
3)   (- 5 , 240)
4)   (- 5 , 60)

45. $\left(-2.5, \dfrac{5\pi}{2}\right)$

1)   (- 2.5 , $\dfrac{\pi}{2}$)
2)   (2.5 , $\dfrac{\pi}{2}$)
3)   (- 2.5 , - $\dfrac{\pi}{2}$)
4)   (2.5 , $\dfrac{\pi}{2}$)

46. $\left(4, \dfrac{11\pi}{4}\right)$

1) $\left(-4, \dfrac{3\pi}{4}\right)$

2) $\left(-4, -\dfrac{3\pi}{4}\right)$

3) $\left(4, \dfrac{11\pi}{4}\right)$

4) $\left(4, \dfrac{3\pi}{4}\right)$

47. $(1.25, -920°)$

1) $(1.25, 160°)$

2) $(1.25, -160°)$

3) $(-1.25, 160°)$

4) $(-1.25, 160°)$

48. $\left(-1, -\frac{21\pi}{8}\right)$

1) $\left(1, \frac{3\pi}{8}\right)$

2) $\left(-1, \frac{3\pi}{8}\right)$

3) $\left(1, -\frac{3\pi}{8}\right)$

4) $\left(-1, -\frac{3\pi}{8}\right)$

49. $(-6, -1460°)$

1) $(-6, -160°)$

2) $(-6, 160°)$

3) $(6, 160°)$

4) $(6, -160°)$

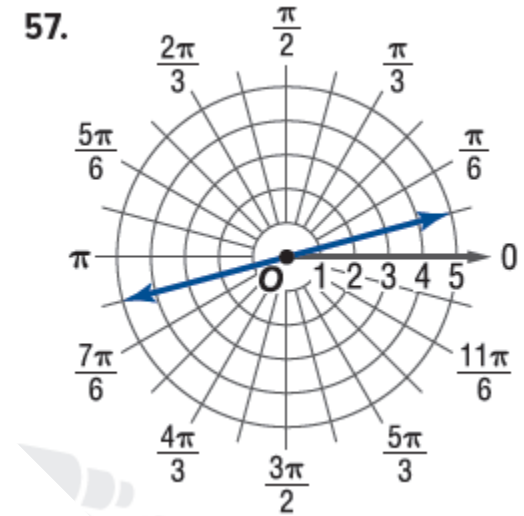| التمثيل البياني للنقاط باستخدام إحداثيات القطب.	Exercises (57-60)	P547
Graph points with polar coordinates.		P475

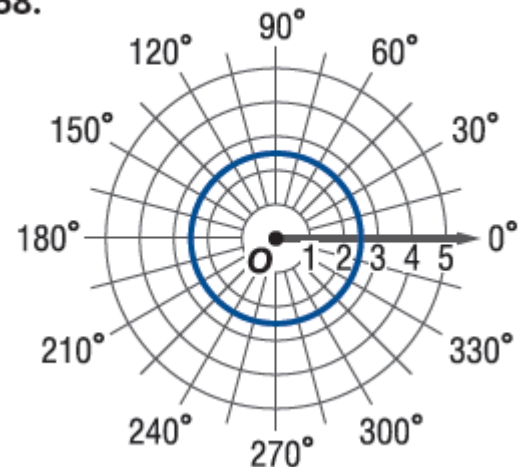# Write an equation for each polar graph.

57.

1) $\theta = \dfrac{\pi}{6}$

2) $\boldsymbol{\theta = \dfrac{\pi}{12}}$

3) $\theta - \dfrac{\pi}{6}$

4) $\theta = -\dfrac{\pi}{12}$

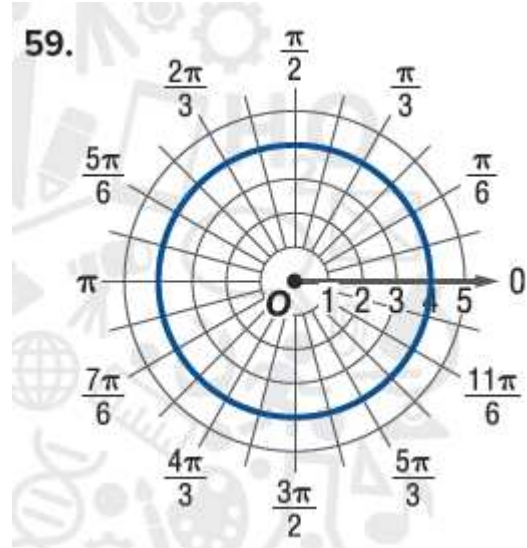**58.**
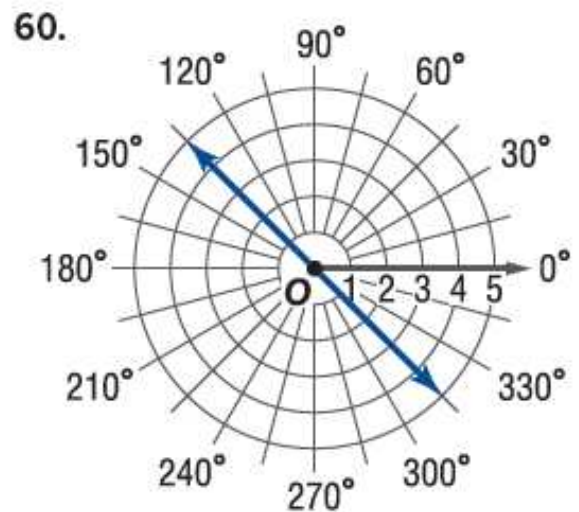

1) $r = 3$

2) $r = 2$

3) $r = 2.5$

4) $r = -3$

1) $r = 4$
2) $r = -3$
3) $r = 3$
4) $r = 5$

59.

1) $\theta = -135°$
2) $\theta = -120°$
3) $\theta = 315$
4) $\theta = 135°$

60.

التحويل بين الإحداثيات القطبية والديكارتية.	Exercises (1-12)	P555
Convert between polar and rectangular coordinates.		P483

KeyConcept Convert Polar to Rectangular Coordinates

If a point P has polar coordinates (r, θ), then the rectangular coordinates (x, y) of P are given by

$x = r \cos \theta$ and $y = r \sin \theta$.

That is, $(x, y) = (r \cos \theta, r \sin \theta)$.
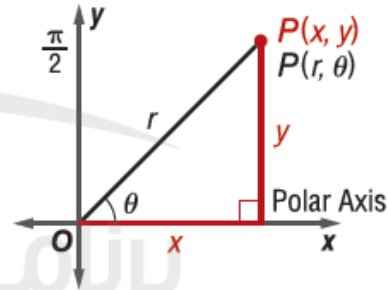
Find the rectangular coordinates for each point with the given polar coordinates. Round to the nearest hundredth, if necessary.

1. $\left(2, \dfrac{\pi}{4} \right)$

1) $(\sqrt{2}, \sqrt{2})$
2) $(\sqrt{2}, -\sqrt{2})$
3) $(-\sqrt{2}, -\sqrt{2})$
4) $(-\sqrt{2}, \sqrt{2})$

2. $\left(\frac{1}{4}, \frac{\pi}{2}\right)$

1) $\left(0, -\frac{1}{4}\right)$

2) $\left(0, \frac{1}{4}\right)$

3) $\left(-\frac{1}{4}, 0\right)$

4) $\left(\frac{1}{4}, 0\right)$

3. $(5, 240°)$

1) $\left(\frac{5}{2}, \frac{5\sqrt{3}}{2}\right)$

2) $\left(-\frac{5}{2}, \frac{5\sqrt{3}}{2}\right)$

3) $\left(\frac{5}{2}, -\frac{5\sqrt{3}}{2}\right)$

4) $\left(-\frac{5}{2}, -\frac{5\sqrt{3}}{2}\right)$

4. $(2.5, 250°)$

1) $(0.86 , 2.35)$
2) $(- 0.86 , 2.35)$
3) $(- 0.86 , - 2.35)$
4) $(0.86 , - 2.35)$

5. $\left(-2, \dfrac{4\pi}{3}\right)$

1) $(1 , \sqrt{3})$
2) $(- 1 , \sqrt{3})$
3) $(1 , - \sqrt{3})$
4) $(-1 , -\sqrt{3})$

6. $(-13, -70°)$

1) $(-4.45, -12.22)$
2) $(-4.45, 12.22)$
3) $(4.45, -12.22)$
4) $(4.45, 12.22)$

7. $\left(3, \dfrac{\pi}{2}\right)$

1) $(3, 0)$
2) $(-3, 0)$
3) $(0, 3)$
4) $(3, -3)$

8. $\left(\dfrac{1}{2}, \dfrac{3\pi}{4}\right)$

1) $\left(\dfrac{\sqrt{2}}{4}, \dfrac{\sqrt{2}}{4}\right)$

2) $\left(\dfrac{\sqrt{2}}{4}, -\dfrac{\sqrt{2}}{4}\right)$

3) $\left(-\dfrac{\sqrt{2}}{4}, -\dfrac{\sqrt{2}}{4}\right)$

4) $\left(-\dfrac{\sqrt{2}}{4}, \dfrac{\sqrt{2}}{4}\right)$

مدرسة الطليعة للتعليم الأساسي والثانوي

Al Taleea School

مجلس 4 / 6

| التحويل بين المعادلات القطبية والديكارتية. | Exercises (36-45) | P555 |
| Convert between polar and rectangular equations. | | P483 |

Write each equation in rectangular form, and then identify its graph. Support your answer by graphing the polar form of the equation.

36. $r = 3 \sin \theta$

1) $x^2 + (y - 1.5)^2 = 2.25$
2) $x^2 + (y + 1.5)^2 = 2.25$
3) $x^2 + (y - 2.25)^2 = 1.5$
4) $x^2 + (y + 2.25)^2 = 1.5$

37. $\theta = -\dfrac{\pi}{3}$

1) $x = -\sqrt{3}\, y$
2) $x = \sqrt{3}\, y$
3) $y = -\sqrt{3}\, x$
4) $y = \sqrt{3}\, x$

38. $r = 10$

1) $x + y = 100$

2) $x^2 + y^2 = 100$

3) $x^2 + y^2 = 10$

4) $x + y = 10$

39. $r = 4 \cos \theta$

1) $x^2 + (y - 2)^2 = 4$

2) $x^2 + (y + 2)^2 = 4$

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

4) $(x - 2)^2 + y^2 = 4$

40. $\tan \theta = 4$

1) $Y = 4x$

2) $Y = 2x$

3) $X = 2y$

4) $X = 4y$

41. $r = 8 \csc \theta$

1) X = 8
2) X = - 8
3) Y = - 8
4) **Y = 8**

42. $r = -4$

1) $x^2 + y^2 = -16$
2) $x^2 + y^2 = 16$
3) $x + y = -16$
4) $x + y = 16$

43. $\cot \theta = -7$

1) $y = -\frac{1}{7} x$
2) $y = \frac{1}{7} x$
3) $x = -\frac{1}{7} y$
4) $x = \frac{1}{7} y$

44. $\theta = \dfrac{3\pi}{4}$

1)   Y = x

2)   **Y = - x**

3)   Y = 1

4)   Y = - 1

45. $r = \sec\theta$

1)   **X = 1**

2)   X = - 1

3)   Y = 1

4)   Y = - 1

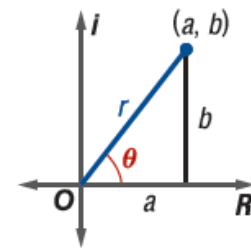| تحويل الأعداد المركبة من الصورة الديكارتية إلى الصورة القطبية والعكس.	Exercises (10-17)	P567
Convert complex numbers from rectangular to polar form and vice versa.		P495

KeyConcept Polar Form of a Complex Number

The polar or trigonometric form of the complex number $z = a + bi$ is
$z = r(\cos \theta + i \sin \theta)$, where

$r = |z| = \sqrt{a^2 + b^2}$, $a = r \cos \theta$, $b = r \sin \theta$, and $\theta = \tan^{-1} \frac{b}{a}$ for
$a > 0$ or $\theta = \tan^{-1} \frac{b}{a} + \pi$ for $a < 0$.

Express each complex number in polar form.

10. $4 + 4i$

1) $\quad 4\sqrt{2}\left(\cos\frac{\pi}{4} - i \sin\frac{\pi}{4}\right)$

2) $\quad 4\sqrt{2}\left(\sin\frac{\pi}{4} - i \cos\frac{\pi}{4}\right)$

3) $\mathbf{4\sqrt{2}\left(\cos\frac{\pi}{4} + i \sin\frac{\pi}{4}\right)}$

4) $\quad 4\sqrt{2}\left(\sin\frac{\pi}{4} + i \cos\frac{\pi}{4}\right)$

11. $-2 + i$

1) $\sqrt{5}\,(\cos 2.68 + i\,\sin 2.68)$
2) $-\sqrt{5}\,(\cos 2.68 + i\,\sin 2.68)$
3) $\sqrt{5}\,(\cos 2.68 - i\,\sin 2.68)$
4) $-\sqrt{5}\,(\cos 2.68 - i\,\sin 2.68)$

12. $4 - \sqrt{2}i$

1) $3\sqrt{2}\,(\cos 0.34 + i\,\sin 0.34)$
2) $\sqrt{2}\,(\cos -0.34 + i\,\sin -0.34)$
3) $\sqrt{2}\,(\cos -0.34 - i\,\sin -0.34)$
4) $3\sqrt{2}\,(\cos -0.34 + i\,\sin -0.34)$

13. $2 - 2i$

1) $2\sqrt{2}\left(\cos\dfrac{\pi}{4} + i\sin\dfrac{\pi}{4}\right)$

2) $\mathbf{2\sqrt{2}\left(\cos\dfrac{7\pi}{4} + i\sin\dfrac{7\pi}{4}\right)}$

3) $2\sqrt{2}\left(\cos\dfrac{\pi}{4} - i\sin\dfrac{\pi}{4}\right)$

4) $2\sqrt{2}\left(\cos\dfrac{7\pi}{4} - i\sin\dfrac{7\pi}{4}\right)$

14. $4 + 5i$

1) $\sqrt{41}\left(\sin 0.9 + i\,\cos 0.9\right)$

2) $\sqrt{41}\left(\cos -0.9 + i\,\sin -0.9\right)$

3) $\mathbf{\sqrt{41}\left(\cos 0.9 + i\,\sin 0.9\right)}$

4) $\sqrt{41}\left(\cos 0.9 - i\,\sin 0.9\right)$

15. $-2 + 4i$

1) $\quad 2\sqrt{5}\,(\cos 2.03 - i\,\sin 2.03)$

2) $\quad \mathbf{2\sqrt{5}\,(\cos 2.03 + i\,\sin 2.03)}$

3) $\quad 2\sqrt{5}\,(\cos -2.03 + i\,\sin -2.03)$

4) $\quad 2\sqrt{5}\,(\cos -2.03 - i\,\sin -2.03)$

16. $-1 - \sqrt{3}i$

1) $\quad \mathbf{2(\cos \frac{4\pi}{3} + i\,\sin \frac{4\pi}{3})}$

2) $\quad 2(\cos \frac{4\pi}{3} - i\,\sin \frac{4\pi}{3})$

3) $\quad 2(\cos \frac{\pi}{3} + i\,\sin \frac{\pi}{3})$

4) $\quad 2(\cos \frac{\pi}{3} - i\,\sin \frac{\pi}{3})$

17. $3 + 3i$

1) $\quad 3\sqrt{2}\,(\cos \frac{3\pi}{4} + i\,\sin \frac{3\pi}{4})$

2) $\quad 3\sqrt{2}\,(\cos \frac{3\pi}{4} - i\,\sin \frac{3\pi}{4})$

3) $\quad \mathbf{3\sqrt{2}\,(\cos \frac{\pi}{4} + i\,\sin \frac{\pi}{4})}$

4) $\quad 3\sqrt{2}\,(\cos \frac{\pi}{4} - i\,\sin \frac{\pi}{4})$

تصنيف وتحديد أنواع الدراسات.		P585
Classify study types.	**Exercises (1-4)**	P513

KeyConcept Study Types

Definition	Example
In a **survey**, data are collected from responses given by members of a population regarding their characteristics, behaviors, or opinions.	To determine whether the student body likes the new cafeteria menu, the student council asks a random sample of students for their opinion.
In an **experiment**, the sample is divided into two groups: • an *experimental group* that undergoes a change, and • a *control group* that does not undergo the change. The effect on the experimental group is then compared to the control group.	A restaurant is considering creating meals with chicken instead of beef. They randomly give half of a group of participants meals with chicken and the other half meals with beef. Then they ask how they like the meals.
In an **observational study**, members of a sample are measured or observed without being affected by the study.	Researchers at an electronics company observe a group of teenagers using different laptops and note their reactions.

Determine whether each situation describes a *survey*, an *experiment*, or an *observational study*. Then identify the sample, and suggest a population from which it may have been selected.

1. **SCHOOL** A group of high school students is randomly selected and asked to complete the form shown.

   Do you agree with the new lunch rules?
   - ☐ agree
   - ☐ disagree
   - ☐ don't care

   1) Experiment
   2) Survey
   3) Observational Study
   4) Statistic

2. **DESIGN** An advertising company wants to test a new logo design. They randomly select 20 participants and watch them discuss the logo.

   1) Experiment
   2) Survey
   3) Observational Study
   4) Statistic

3. **LITERACY** A literacy group wants to determine whether high school students that participated in a recent national reading program had higher standardized test scores than high school students that did not participate in the program.

    1)   Experiment
    2)   Survey
    3)   **Observational Study**
    4)   Statistic

4. **RETAIL** The research department of a retail company plans to conduct a study to determine whether a dye used on a new T-shirt will begin fading before 50 washes.

    1)   Experiment
    2)   Survey
    3)   **Observational Study**
    4)   Statistic

إعداد دراسة إحصائية. Design statistical studies.	Exercises (18-23)	P586 P514

Determine whether each survey question is *biased* or *unbiased*. If biased, explain your reasoning.

18. Do you think that the school needs a new gym and soccer field?

1) **Biased**

2) Unbiased

19. Which is your favorite soccer team, Barcelona or Real Madrid?

1) **Biased**

2) Unbiased

20. Do you play any extracurricular sports?

1) Biased

2) **Unbiased**

21. Don't you agree that students should carpool to school?

1) **Biased**

2) Unbiased

Which question is unbiased?

a. Does the school board have the right to enforce a dress code?

b. Do you think the mayor is doing a good job in spite of his questionable character?

c. Do you prefer daytime or evening television programming?

d. Do you think the government should be allowed to cut down trees willy-nilly to build a new highway?

Which question is biased?

a. Do you prefer daytime or evening television programing?

b. Should there be a school dress code?

c. Do you prefer news or mindless sitcoms?

d. Do you think a new highway should be built?

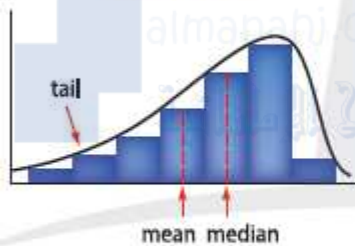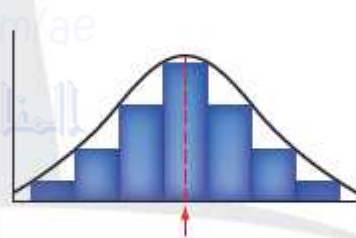| استخدام منحنيات التوزيعات لتحديد الاحصاء المناسب. **Use the shapes of distributions to select appropriate statistics.**	**Shapes**	**P593** **P521**

KeyConcept Symmetric and Skewed Distributions
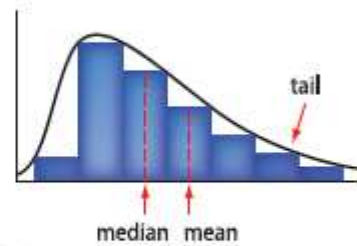
Negatively Skewed Distribution

tail

mean median

- The mean is less than the median.
- The majority of the data are on the right of the mean.

Symmetric Distribution

- The mean and median are approximately equal.
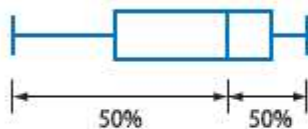- The data are evenly distributed on both sides of the mean.

Positively Skewed Distribution

tail

median mean

- The mean is greater than the median.
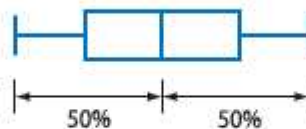- The majority of the data are on the left of the mean.

KeyConcept Box-and-Whisker Plots as Distributions

Negatively Skewed

50% 50%
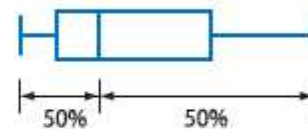
The data to the left of the median are distributed over a wider range than the data to the right. The data have a tail to the left.

Symmetric

50% 50%

The data are equally distributed to the left and right of the median.

Positively Skewed

50% 50%

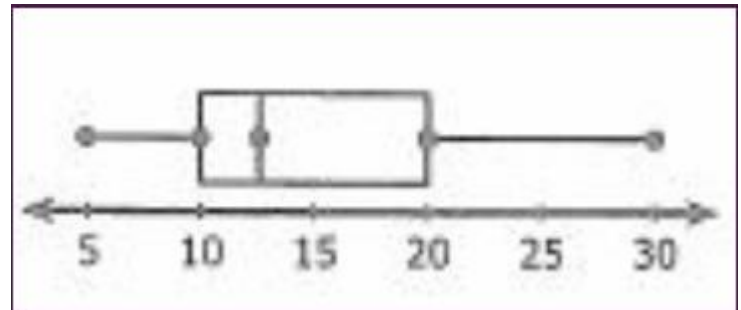The data to the right of the median are distributed over a wider range than the data to the left. The data have a tail to the right.
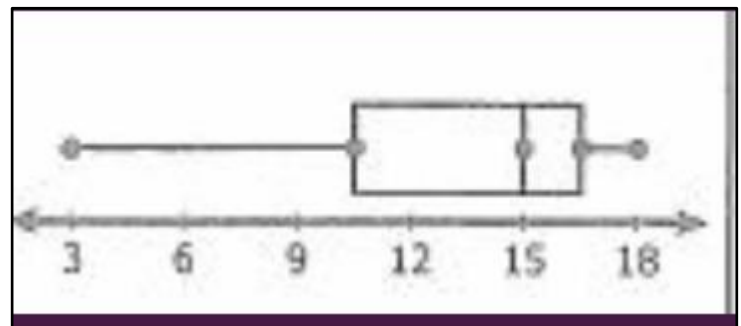
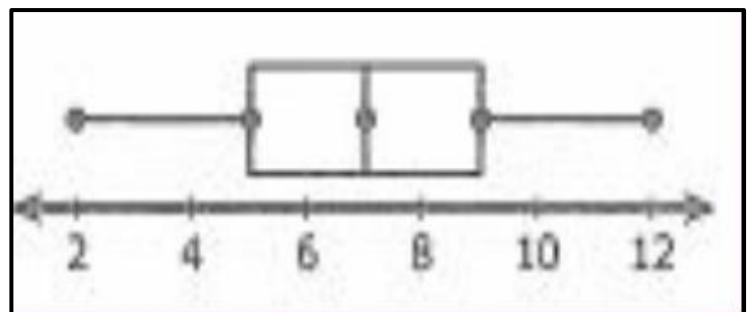Which of the following best describes the shape of the distribution ?

1) Skewed left
2) **Skewed right**
3) Symmetrical
4) Uniform

1) **Skewed left**
2) Skewed right
3) Symmetrical
4) Uniform

1) Skewed left
2) Skewed right
3) **Symmetrical**
4) Uniform

إنشاء توزيع احتمالي. Construct a probability distribution.	Exercises (1-4) و(6-9)	P605 P533

The value of a random variable is the numerical outcome of a random event. A random variable can be discrete or continuous. Discrete random variables represent countable values. Continuous random variables can take on any value.

KeyConcept Expected Value of a Discrete Random Variable

Words The expected value of a discrete random variable is the weighted average of the values of the variable. It is calculated by finding the sum of the products of every possible value of X and its associated probability $P(X)$.

Symbols $E(X) = \sum [X \cdot P(X)]$

KeyConcept Standard Deviation of a Probability Distribution

Words For each value of X, subtract the mean from X and square the difference. Then multiply by the probability of X. The sum of each of these products is the variance. The standard deviation is the square root of the variance.

Symbols Variance: $\sigma^2 = \sum[[X - E(X)]^2 \cdot P(X)]$

Standard Deviation: $\sigma = \sqrt{\sigma^2}$

Identify the random variable in each distribution, and classify it as *discrete* or *continuous*. Explain your reasoning.

1. the number of pages linked to a Web page

    1)   Discrete
    2)   Continuous

2. the number of stations in a cable package

    1)   Discrete
    2)   Continuous

3. the amount of precipitation in a city per month

    1)   Discrete
    2)   Continuous

4. the number of cars passing through an intersection in a given time interval

    1)   Discrete
    2)   Continuous

Identify the random variable in each distribution, and classify it as *discrete* or *continuous*. Explain your reasoning.

6. the number of texts received per week

1) **Discrete**
2) Continuous

7. the number of diggs (or "likes") for a Web page

1) **Discrete**
2) Continuous

8. the height of a plant after a specific amount of time

1) Discrete
2) **Continuous**

9. the number of files infected by a computer virus

1) **Discrete**
2) Continuous

. Which one of these variables is a continuous random variable?

A. *The time it takes a randomly selected student to complete an exam.*
B. The number of tattoos a randomly selected person has.
C. The number of women taller than 68 inches in a random sample of 5 women.
D. The number of correct guesses on a multiple choice test.

Which of the following is considered a discrete random variable?

(A) The number of ounces of coke in a 12oz can
(B) The number of headaches experienced in a day at EHS
(C) The amount of time it takes for a car to start
(D) The amount of carbon monoxide in the air (in moles)
(E) All of the above are discrete

مدرسة الطليعة للتعليم الأساسي والثانوي
Al Taleea School

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تحليل التوزيعات التكرارية وتلخيص الاحصاءات ذات الصلة. Analyze a probability distribution and its summary statistics.	Exercises (11-15)	P605+P606 P533+P534

11. **SNOW DAYS** The following probability distribution lists the probable number of snow days per school year at Al Nadha Secondary School. Use this information to determine the expected number of snow days per year.

Number of Snow Days Per Year									
Days	0	1	2	3	4	5	6	7	8
Probability	0.1	0.1	0.15	0.15	0.25	0.1	0.08	0.05	0.02

1)   1
2)   **3.34**
3)   36
4)   0.34

13. **COMPETITION** The table shows the probability distribution for a competition if 100 tickets are sold for AED 5 each. There is 1 prize for AED 100, 5 prizes for AED 50, and 10 prizes for AED 25.

Distribution of Prizes			
Prize	no prize	AED 100	AED 50	AED 25
Probability	0.84	0.01	0.05	0.10

Find the expected value.

1)   **1.2**
2)   0.4
3)   0.8
4)   0.7

15. BASKETBALL The distribution below lists the probability of the number of m
the first round of a basketball tournament each year.

Number of Upsets Per Year									
Upsets	0	1	2	3	4	5	6	7	8
Probability	$\frac{1}{32}$	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{5}{16}$	$\frac{1}{8}$	$\frac{3}{32}$	$\frac{1}{32}$

a. Determine the expected number of upsets. Interpret your results.

1) $\dfrac{139}{32}$

2) $\dfrac{39}{32}$

3) $\dfrac{36}{32}$

4) $\dfrac{32}{139}$

b. Find the standard deviation.

1) 3.6
2) 12.96
3) 1.9
4) 9.1

The payoff (X) for a lottery game has the following probability distribution.

X = payoff	$0	$5
probability	0.8	0.2

A. What is the *expected value* of X= payoff?
B. $0
C. $0.50
D. $1.00
E. $2.50

إيجاد الاحتمالات باستخدام التوزيع ذي الحدين. **Find probabilities using binomial distributions.**	Exercises (14-20)	P615 P543

KeyConcept Binomial Probability Formula

The probability of X successes in n independent trials is

$$P(X) = {}_nC_X \, p^X q^{n-X},$$

where p is the probability of success of an individual trial and q is the probability of failure on that same individual trial ($q = 1 - p$).

14. **PERSONAL MEDIA PLAYERS** According to a recent survey, 85% of high school students own a personal media player. What is the probability that 6 out of 10 random high school students own a personal media player?

1) **0.04**

2) 0.4

3) 0.15

4) 0.6

15. **CARS** According to a recent survey, 92% of high school grade 12 students drive their own car. What is the probability that 10 out of 12 random high school students drive their own car?

1) 0.92
2) 0.08
3) 0.817
4) **0.183**

16. **GRADE 12 GRADUATION** According to a recent survey, 25% of high school upperclassmen think that the grade 12 graduation is the most important event of the school year. What is the probability that 3 out of 15 random high school upperclassmen think this way?

  1) 0.775
  2) **0.225**
  3) 0.25
  4) 0.75

17. **SOCCER** A certain soccer team has won 75.7% of their games. Find the probability that they win 7 of their next 12 games.

  1) 0.757
  2) 0.243
  3) 0.096
  4) 0.904

18. **GARDENING** Zayed is planting 24 irises in his front yard. The flowers he bought were a combination of two varieties, blue and white. The flowers are not blooming yet, but Zayed knows that the probability of having a blue flower is 75%. What is the probability that 20 of the flowers will be blue?

  1) 0.75
  2) 0.25
  3) 0.2
  4) 0.132

19. RUGBY A penalty goal kicker is accurate 75% of the time from within 35 m. What is the probability that he makes exactly 7 of his next 10 kicks from within 35 m?

Range (m)	Accuracy (%)
0–35	75
35–45	62
45+	20

1)   0.35
2)   0.25
3)   0.75
4)   0.7

20. BABIES Mr. and Mrs. Salem are planning to have 3 children. The probability of each child being a boy is 50%. What is the probability that they will have 2 boys?
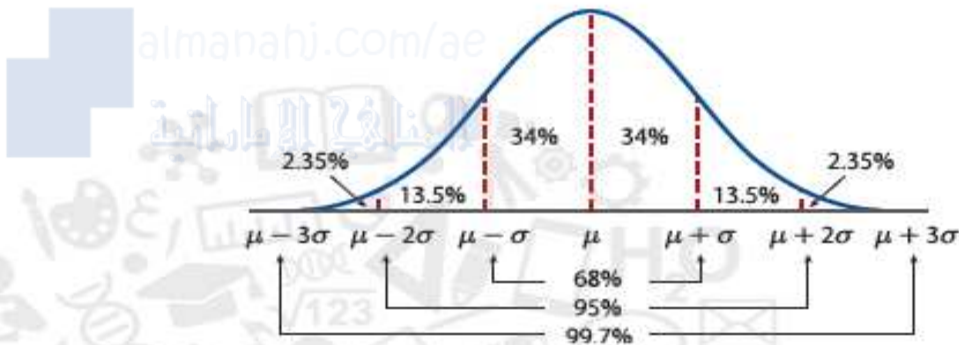
1)   0.375
2)   0.625
3)   0.5
4)   0.2

| إيجاد المساحة المحصورة تحت منحنيات التوزيع.	Exercises (3-6)	P625
Find area under normal distribution curves.		P553

KeyConcept The Empirical Rule

In a normal distribution with mean μ and standard deviation σ:

- approximately 68% of the data values fall between $\mu - \sigma$ and $\mu + \sigma$.
- approximately 95% of the data values fall between $\mu - 2\sigma$ and $\mu + 2\sigma$.
- approximately 99.7% of the data values fall between $\mu - 3\sigma$ and $\mu + 3\sigma$.

KeyConcept Characteristics of the Standard Normal Distribution

- The total area under the curve is equal to 1 or 100%.
- Almost all of the area is between $z = -3$ and $z = 3$.
- The distribution is symmetric.
- The mean is 0, and the standard deviation is 1.
- The curve approaches, but never touches, the x-axis.
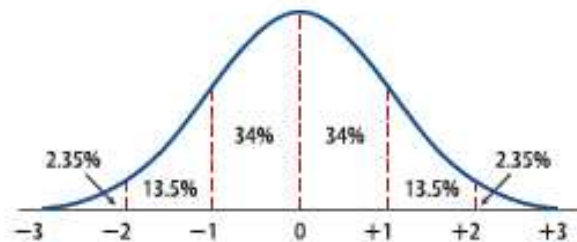
KeyConcept Formula for z-Values

The z-value for a data value in a set of data is given by $z = \dfrac{X - \mu}{\sigma}$, where X is the data value, μ is the mean, and σ is the standard deviation.

Find each of the following.

3. z if $X = 19$, $\mu = 22$, and $\sigma = 2.6$

   1) **-1.15**
   2) 1.15
   3) 0.75
   4) 1.02

4. X if $z = 2.3$, $\mu = 64$, and $\sigma = 1.3$

   1) -66.99
   2) -47.46
   3) -27.26
   4) **66.99**

5. z if $X = 52$, $\mu = 43$, and $\sigma = 3.7$

   1) -2.43
   2) **2.43**
   3) 25.68
   4) -25.68

6. X if $z = 2.5$, $\mu = 27$, and $\sigma = 0.4$

   1) -28
   2) -61.25
   3) **28**
   4) -10.64

مدرسة الطليعة للتعليم الأساسي والثانوي

Al Taleea School

مجلس ٤/ 6

| إيجاد احتمالات التوزيعات الطبيعية، وإيجاد قيم البيانات عند إعطاء الاحتمالات. | Exercises (18-21) | P625 |
| Find probabilities for normal distributions, and find data values given probabilities | | P553 |

18. **HEALTH** The average blood cholesterol level in adult Americans is 203 mg/dL (milligrams per deciliter) with a standard deviation of 38.8 mg/dL. Find each probability. Assume that the data are normally distributed. (Example 5)

a. a blood cholesterol level below 160 mg/dL, which is considered low and can lead to a higher risk of stroke

1) **13 %**
2) 87 %
3) 19 %
4) 81 %

b. a blood cholesterol level above 240 mg/dL, which is considered high and can lead to higher risk of heart disease

1) 83 %
2) **17 %**
3) 84 %
4) 71 %

c. a blood cholesterol level between 180 and 200 mg/dL, which is considered normal

1) 81 %
2) 20 %
3) 87 %
4) **19 %**

19. **SNOWFALL** The average annual snowfall in centimeters for the U.S. and Canada region from 45°N to 55°N is normally distributed with $\mu = 260$ and $\sigma = 27$. (Example 6)

a. Determine the minimum amount of snowfall occurring in the top 15% of the distribution.

1) **288 cm**
2) 200 cm
3) 300 cm
4) 188 cm

b. Determine the maximum amount of snowfall occurring in the bottom 30%.

1) 250 cm
2) 300 cm
3) **245.8**
4) 240 cm

c. What range of snowfall occurs in the middle 60%?

1) 240.2 cm – 285.3 cm
2) 230.1 cm – 249.6 cm
3) 235.7 cm – 280.8 cm
4) **237.3 cm - 282.7 cm**

20. TRAFFIC SPEED The speed in kilometers per hour of traffic on North Street is normally distributed with $\mu = 60$ and $\sigma = 9$. (Example 6)

a. Determine the maximum speed of the slowest 10% of cars driving on North Street.

1) **40 km / h**
2) 35 km / h
3) 38 km / h
4) 42 km / h

b. Determine the minimum speed of the fastest 5% of cars driving on North Street.

1) 70 km / h
2) 65 km / h
3) **75 km / h**
4) 80 km / h

c. At what range of speed do the middle 25% of cars on North Street drive?

1) 60 km / h – 63 km / h
2) **57 km / h – 63 km / h**
3) 57 km / h – 60 km / h
4) 54 km / h – 57 km / h

21. TESTS Saleh took the ACT and SAT and earned the math scores shown. Which of the scores has a higher relative position? Explain your reasoning.

Test	Saleh's Score	National Average	Standard Deviation
ACT	27	21	4.7
SAT	620	508	111

1) SAT scores has a higher relative position than ACT scores.

2) **ACT scores has a higher relative position than SAT scores.**

3) Both are equal.

4) We don't have enough information to compare between them.