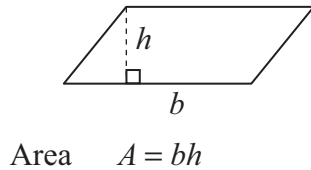# Clark County School District
K–12 Mathematics

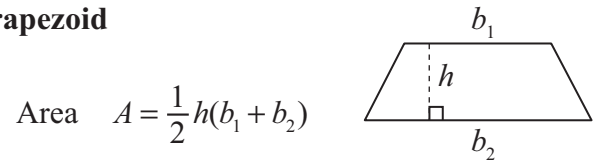# High School Practice Proficiency Examination Fall 2009

Formula Sheet

Note to Student: You may use these formulas throughout this entire test. Feel free to use this Formula Sheet as needed during your testing time.
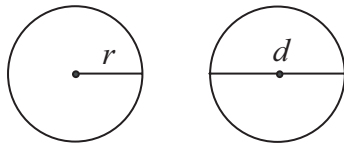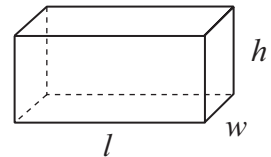
Parallelogram

Area $\quad A = bh$

Trapezoid

Area $\quad A = \dfrac{1}{2}h(b_1 + b_2)$

Circle

Circumference $\quad C = 2\pi r$

$C = \pi d$

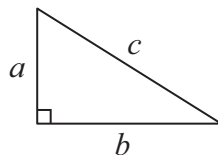Area $\quad A = \pi r^2$

Rectangular Solid

Volume $\quad V = lwh$

Surface Area $\quad SA = 2lw + 2lh + 2hw$

Pythagorean Theorem

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

Cylinder
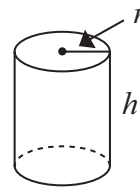
Volume $\quad V = \pi r^2 h$

Cone
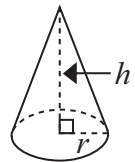
Volume $\quad V = \dfrac{1}{3}\pi r^2 h$
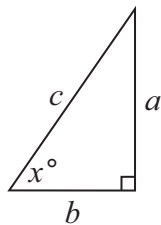
Trigonometric Ratios

$\sin x = \dfrac{a}{c}$

$\cos x = \dfrac{b}{c}$

$\tan x = \dfrac{a}{b}$

Permutations

$$_n\mathrm{P}_k = \dfrac{n!}{(n-k)!}$$

Combinations

$$_n\mathrm{C}_k = \dfrac{n!}{k!(n-k)!}$$

Special Right Triangles
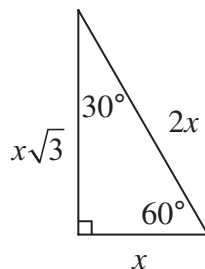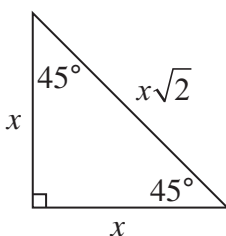
Temperature Formulas

$$^\circ\mathrm{F} = \dfrac{9}{5}\mathrm{C} + 32$$

$$^\circ\mathrm{C} = \dfrac{5}{9}(\mathrm{F} - 32)$$

1. Add.

$$\begin{bmatrix} -4 & 2 \\ 3 & -1 \end{bmatrix} + \begin{bmatrix} 5 & 0 \\ -2 & 1 \end{bmatrix}$$

   A. $\begin{bmatrix} -20 & 0 \\ -6 & -1 \end{bmatrix}$

   B. $\begin{bmatrix} 1 & 2 \\ -1 & -1 \end{bmatrix}$

   C. $\begin{bmatrix} 1 & 2 \\ 1 & 0 \end{bmatrix}$

   D. $\begin{bmatrix} 1 & 2 \\ 3 & -1 \end{bmatrix}$

2. An expression is given below.

   $$\sqrt{2}\left(\sqrt{8} + y\right)$$

   Which expression is equivalent to the one given?

   A. $\sqrt{10} + y$

   B. $\sqrt{10} + y\sqrt{2}$

   C. $4 + y$

   D. $4 + y\sqrt{2}$

3. A set of data is arranged in numerical order. What value represents the spread of the middle half of the data?
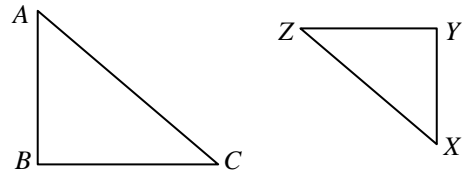
   A. interquartile range

   B. mean

   C. median

   D. range

4. In the diagram below, $AB = 4$, $AC = 6$, $XY = 3$, and $\triangle ABC \sim \triangle XYZ$.

   What is XZ?

   A. $3\frac{1}{2}$

   B. $4\frac{1}{2}$

   C. 8

   D. 10

5. The first six terms of a sequence are shown below.

   8   17   32   53   80   113

   The sequence continues. Which expression represents the nth term of the sequence?

   A. $2n + 1$

   B. $9n - 1$

   C. $3n^2 + 5$

   D. $2n^2 + 3n$

6. A box is in the shape of a rectangular prism. The height of the box is 4 inches. The length of the box is twice the width of the box. The volume of the box is 400 cubic inches. What is the width of the box in inches?

   A. $5\sqrt{2}$ in.

   B. 10 in.

   C. $10\sqrt{2}$ in.

   D. 100 in.

7. Which expression shows how the distributive property can be used to calculate the cost of 6 jars of peanut butter costing $3.98 per jar?

   A. $3(3.00) + 3(0.98)$

   B. $3(4.00) - 3(0.02)$

   C. $6(3.00) - 6(0.98)$

   D. $6(4.00) - 6(0.02)$

8. A radio station is considering changing its format from country-western music to hip-hop. It asks its current listeners to call in and give their opinion about the change. Which BEST describes why this survey is **biased**?

    A. Current listeners will not want a change in format.

    B. Some listeners may call in more than once.

    C. Some listeners may not learn about the survey and couldn't give their opinion.

    D. The station may not have enough phone lines to handle all the listeners' calls.

9. Use the federal tax tables and information given below.

2007 Tax Table — *Continued*

If line 43 (taxable income) is—		And you are—			
At least	But less than	Single	Married filing jointly *	Married filing separately	Head of a household
		Your tax is —			
50,000					
50,000	50,050	8,930	6,721	8,930	7,681
50,050	50,100	8,943	6,729	8,943	7,694
50,100	50,150	8,955	6,736	8,955	7,706
50,150	50,200	8,968	6,744	8,968	7,719
50,200	50,250	8,980	6,751	8,980	7,731
50,250	50,300	8,993	6,759	8,993	7,744
50,300	50,350	9,005	6,766	9,005	7,756
50,350	50,400	9,018	6,774	9,018	7,769
50,400	50,450	9,030	6,781	9,030	7,781
50,450	50,500	9,043	6,789	9,043	7,794
50,500	50,550	9,055	6,796	9,055	7,806
50,550	50,600	9,068	6,804	9,068	7,819
50,600	50,650	9,080	6,811	9,080	7,831
50,650	50,700	9,093	6,819	9,093	7,844
50,700	50,750	9,105	6,826	9,105	7,856
50,750	50,800	9,118	6,834	9,118	7,869
50,800	50,850	9,130	6,841	9,130	7,881
50,850	50,900	9,143	6,849	9,143	7,894
50,900	50,950	9,155	6,856	9,155	7,906
50,950	51,000	9,168	6,864	9,168	7,919

2008 Tax Table — *Continued*

If line 43 (taxable income) is—		And you are—			
At least	But less than	Single	Married filing jointly *	Married filing separately	Head of a household
		Your tax is —			
50,000					
50,000	50,050	8,850	6,701	8,850	7,569
50,050	50,100	8,863	6,709	8,863	7,581
50,100	50,150	8,875	6,716	8,875	7,594
50,150	50,200	8,888	6,724	8,888	7,606
50,200	50,250	8,900	6,731	8,900	7,619
50,250	50,300	8,913	6,739	8,913	7,631
50,300	50,350	8,925	6,746	8,925	7,644
50,350	50,400	8,938	6,754	8,938	7,656
50,400	50,450	8,950	6,761	8,950	7,669
50,450	50,500	8,963	6,769	8,963	7,681
50,500	50,550	8,975	6,776	8,975	7,694
50,550	50,600	8,988	6,784	8,988	7,706
50,600	50,650	9,000	6,791	9,000	7,719
50,650	50,700	9,013	6,799	9,013	7,731
50,700	50,750	9,025	6,806	9,025	7,744
50,750	50,800	9,038	6,814	9,038	7,756
50,800	50,850	9,050	6,821	9,050	7,769
50,850	50,900	9,063	6,829	9,063	7,781
50,900	50,950	9,075	6,836	9,075	7,794
50,950	51,000	9,088	6,844	9,088	7,806

- In 2007, Jason's taxable income was $50,000 and he filed his taxes as a *single* taxpayer.

- In 2008, Jason's taxable income was $420 more than in 2007, and he filed as *Married filing jointly* with his new spouse who had no taxable income.

How did Jason's federal taxes in 2008 compare to his federal taxes in 2007?

    A. His tax was $20 more in 2008.

    B. His tax was $40 more in 2008.

    C. His tax was $2,169 less in 2008.

    D. His tax was $2,229 less in 2008.

10. A function and its range are shown below.

    $$f(x) = 2x - 5$$

    Range: $f(x) \in \{-7, -1, 1, 3\}$

    What is the domain of the function?

    A. $x \in \{-1, 2, 3, 4\}$

    B. $x \in \{-7, -1, 1, 3\}$

    C. $x \in \{-19, -7, -3, 1\}$

    D. $x \in \{-24, -12, -8, -4\}$

11. Two fair, six-sided dice are rolled. What is the probability that the sum of the two dice is 3 or 7?

    A. $\dfrac{2}{36}$

    B. $\dfrac{8}{36}$

    C. $\dfrac{12}{36}$

    D. $\dfrac{18}{36}$

12. John, Robert, and Tom have the same type of cellular phone. Each man measured his phone's length; the results are shown in the table below.

Name	Measured Length
John	9 cm
Robert	10.3 cm
Tom	9.85 cm

    The actual length of the phone is 9.5 cm. Who had the most accurate measurement?

    A. John

    B. Robert

    C. Tom

    D. All three measurements were equally accurate.

13. The equation of a line is given below.

    $$2x + 3y = 12$$

    What is the slope of the line?

    A. $-\dfrac{3}{2}$

    B. $-\dfrac{2}{3}$

    C. 2

    D. 4

14. An equation is shown below.

    $$\frac{2g}{3h} - \frac{h-1}{6} = -\frac{2}{h}$$

    Which is an equivalent equation solved for g?

    A. $g = \dfrac{h-1}{2}$

    B. $g = \dfrac{h-3}{2}$

    C. $g = \dfrac{(h+4)(h-3)}{4}$

    D. $g = \dfrac{(h-4)(h+3)}{4}$

15. Two students did surveys for a class project. Descriptions of their surveys are listed below.

    - Raphael wanted to know where his classmates were born. Each student in the class was asked to give his birthplace.

    - Anne wanted to know about the recycling program at school. Twenty freshmen, twenty sophomores, twenty juniors, and twenty seniors were randomly selected and asked their opinions about recycling.

    Which statement is correct?

    A. Raphael took a sample and Anne did a census.

    B. Raphael did a census and Anne took a sample.

    C. Both students took a sample.

    D. Both students did a census.

16. In the diagram below, a 5-foot pole $\overline{BP}$ is erected at the corner of an 8-foot by 6-foot rectangular concrete pad *ABCD* . The pole is perpendicular to the pad and anchored with a guy wire $\overline{PD}$.

5 ft

P

B

C

6 ft

A

D

8 ft
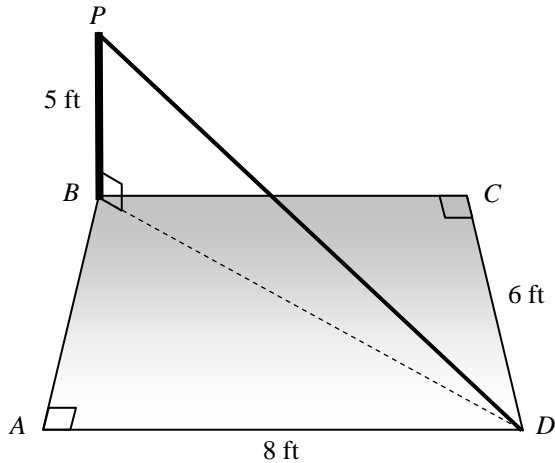
Note: Diagram not drawn to scale

What is the length of the guy wire, *PD*, in feet?

A. $5\sqrt{5}$ feet

B. $\sqrt{35}$ feet

C. $\sqrt{10} + \sqrt{5}$ feet

D. $10 + \sqrt{5}$ feet

17. Which value is between 6 and 7?

A. $\sqrt{29}$

B. $\sqrt{36}$

C. $\sqrt{39}$

D. $\sqrt{50}$

18. The first four terms of a sequence are shown below.

1   4   9   16

The sequence continues. What is the tenth term of the sequence?

A. 10

B. 20

C. 100

D. 200

19. The table below shows the profit (in thousands of dollars) earned by a company in each of five recent years.

Year	2004	2005	2006	2007	2008
Profit (x1000)	$106	$342	$498	$571	$632

Between which two consecutive years did the company show the greatest increase in profits?

A. 2004 to 2005

B. 2005 to 2006

C. 2006 to 2007

D. 2007 to 2008

20. In the diagram below, points *A*, *C*, and *D*, are on circle *O*.

A

C

100°

O

D
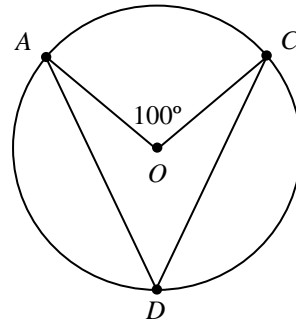
What is the measure of $\angle ADC$?

A. 25°

B. 50°

C. 100°

D. 200°

21. A sandwich shop advertises it can make 110 different sandwiches consisting of one type of bread, one type of meat, and one type of cheese. The shop offers two types of bread and five types of meat. How many different types of cheese does the shop offer?

A. 10

B. 11

C. 22

D. 55
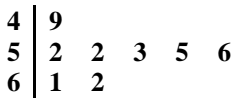
22. An equation is shown below.

    $$x^2 + 6x - 72 = 0$$

    What is the solution set of the equation?

    A. $\{-12, 6\}$

    B. $\{-9, 8\}$

    C. $\{-8, 9\}$

    D. $\{-6, 12\}$

23. The stem-and-leaf plot below shows the speeds of eight cars on a highway.

    ```
    4 | 9
    5 | 2  2  3  5  6
    6 | 1  2
    ```
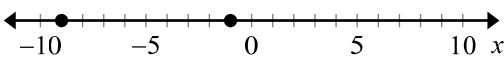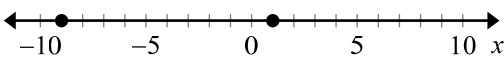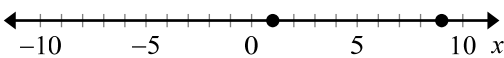
    4|9 represents 49 miles per hour
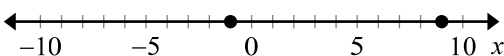
    What is the median speed?

    A. 52 mph

    B. 53 mph

    C. 54 mph

    D. 55 mph

24. Look at the equation below.

    $$\left|-x - 4\right| = 5$$

    Which graph represents the solution set of the equation?

    A.

    B.

    C.

    D.

25. The equation below illustrates a property of real numbers.

    $$2(10 + 20) + 30 = 2(20 + 10) + 30$$

    Which property is illustrated by the equation?

    A. associative property

    B. commutative property

    C. distributive property

    D. identity property

26. The box-and-whisker plots below show the distributions of the points scored by two basketball teams in their last twenty games.
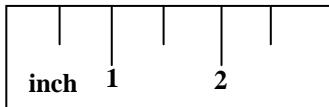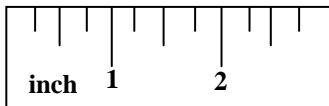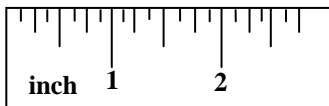
    Points Scored in the Last Twenty Games
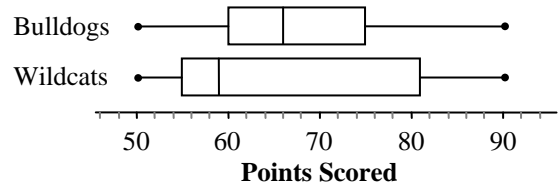
    Which is a correct conclusion about the scores of the two teams' last twenty games?

    A. The interquartile ranges are the same for both teams.

    B. The range for the Wildcats is greater than the range for the Bulldogs.

    C. The Bulldogs scored greater than 80 points in more games than the Wildcats.

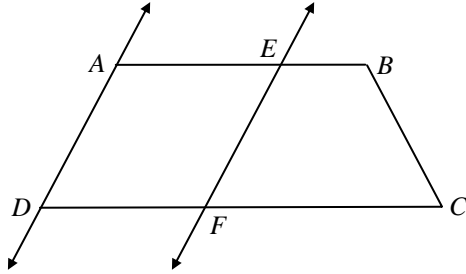   D. The Wildcats scored fewer than 60 points in more games than the Bulldogs.

27. A student is measuring the length of a textbook with a ruler. Which shows the ruler with the greatest precision?

    A.

    B.

    C.

    D.

28. In the figure, quadrilateral *ABCD* is a trapezoid, $\overrightarrow{AD} \parallel \overrightarrow{EF}$, and $m\angle BEF = 125°$.

What is $m\angle ADF$?

   A.   35°

   B.   55°

   C.   70°

   D.   125°

29. A bag contains 16 chocolate, 12 caramel, and 8 almond candies. One candy is chosen randomly. What is the probability that the chosen candy is a caramel?

   A. $\dfrac{1}{4}$

   B. $\dfrac{1}{3}$

   C. $\dfrac{1}{2}$

   D. $\dfrac{5}{8}$

30. A system of equations is shown below.

$$\begin{cases} 5x + 3y = 7 \\ 2x - y = 6 \end{cases}$$

What is the *x*-value in the solution of the system of equations?

   A. $x = -\dfrac{40}{11}$

   B. $x = -\dfrac{16}{11}$

   C. $x = \dfrac{13}{11}$

   D. $x = \dfrac{25}{11}$

31. The graph of a linear equation is shown below.
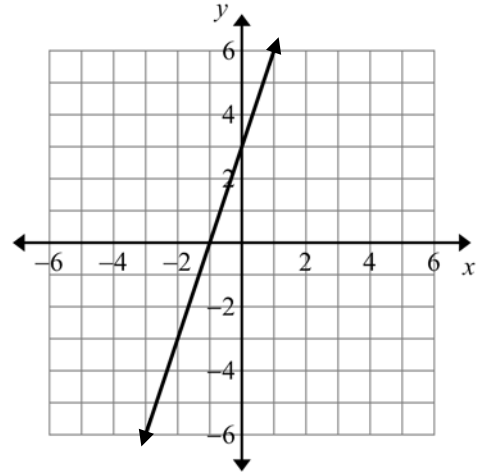
Which equation represents a line parallel to the given line?

   A. $y = -\dfrac{1}{3}x$

   B. $y = -3x$

   C. $y = \dfrac{1}{3}x$

   D. $y = 3x$

32. What is the value of $\sqrt{400} + \sqrt[3]{1000}$?

   A.   30

   B.   50

   C.   140

   D.   300

33. The matrix below represents the inventory at a clothing store.

	Small	Medium	Large
Shirts	490	530	602
Sweaters	250	360	420
Pants	321	500	615

How many medium sweaters does the store have in stock?

   A.   250

   B.   360

   C.   420

   D.   530

34. What must be added to $2n^2 + 4$ to get $5n^2 + 3n - 6$?

   A. $3n^2 + 3n - 10$

   B. $3n^2 + 3n - 2$

   C. $7n^2 + 3n - 2$

   D. $7n^2 + 3n - 10$

35. Use the facts below.

   - **Allie, Betty, Carlos, and Dan each have a different favorite color: blue, green, red, or yellow.**

   - **Allie and Dan do not have blue as their favorite.**

   - **Betty's favorite color is yellow.**

   - **Dan's favorite color is not red.**

   What is Carlos' favorite color?

   A. blue

   B. green

   C. red

   D. yellow

36. Two companies build birdhouses. Company A pays their employees $100 per day plus $5 per birdhouse built. Company B pays their employees $20 per day plus $25 per birdhouse. How many birdhouses would have to be built in one day for an employee of either company to be paid the same amount?

   A. 3 birdhouses

   B. 4 birdhouses

   C. 5 birdhouses

   D. 6 birdhouses

37. To make fudge, the candy mix must be heated to a temperature of 115° Celsius. What is the approximate equivalent temperature in Fahrenheit?

   A. 96° F

   B. 175° F

   C. 239° F

   D. 265° F

38. Use the numbers below.

   $$\sqrt[3]{8} \quad 3^3 \quad \sqrt{26} \quad 25 \quad 2\sqrt{5}$$

   Which list is ordered from least to greatest?

   A. $3^3 \quad 2\sqrt{5} \quad \sqrt[3]{8} \quad \sqrt{26} \quad 25$

   B. $\sqrt[3]{8} \quad \sqrt{26} \quad 2\sqrt{5} \quad 25 \quad 3^3$

   C. $3^3 \quad 25 \quad \sqrt{26} \quad 2\sqrt{5} \quad \sqrt[3]{8}$

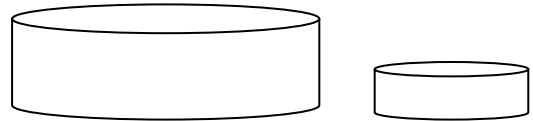   D. $\sqrt[3]{8} \quad 2\sqrt{5} \quad \sqrt{26} \quad 25 \quad 3^3$

39. An equation is shown below.

   $$PV = nRT$$

   Which shows the equation correctly solved for R?

   A. $R = \dfrac{PVT}{n}$

   B. $R = \dfrac{PVn}{T}$

   C. $R = \dfrac{PV}{nT}$

   D. $R = \dfrac{PT}{Vn}$

40. Use the diagrams of cylinders below.

   The larger cylinder has a radius of 0.8 inches and a height of 0.6 inches. The smaller cylinder has a radius of 0.4 inches and a height of 0.3 inches. What is the ratio of the volume of the larger cylinder to that of the smaller cylinder?

   A. 2 to 1

   B. 3 to 1

   C. 4 to 1

   D. 8 to 1