17. Which of the following is the slope of a line parallel to the line $y = \frac{2}{3}x - 4$ in the standard (x,y) coordinate plane?

A. -4

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

C. 2

D. $\frac{3}{2}$

E. $\frac{2}{3}$

18. Janelle cut a board 30 feet long into 2 pieces. The ratio of the lengths of the 2 pieces is 2:3. What is the length, to the nearest foot, of the shorter piece?

F. 5
G. 6
H. 12
J. 15
K. 18

19. What is the smallest integer greater than $\sqrt{58}$?

A. 4
B. 7
C. 8
D. 10
E. 30

20. Sergio plans to paint the 4 walls of his room with 1 coat of paint. The walls are rectangular, and, according to his measurements, each wall is 10 feet by 15 feet. He will not need to paint the single 3-foot-by-5-foot rectangular window in his room and the $3\frac{1}{2}$-foot-by-7-foot rectangular door. Sergio knows that each gallon of paint covers between 300 and 350 square feet. If only 1-gallon cans of paint are available, which of the following is the minimum number of cans of paint Sergio needs to buy to paint his walls?

F. 1
G. 2
H. 3
J. 4
K. 5

21. What values of x are solutions for $x^2 + 2x = 8$?

A. -4 and 2
B. -2 and 0
C. -2 and 4
D. 0 and 2
E. 6 and 8

22. For all $a > 1$, the expression $\frac{3a^4}{3a^6}$ equals:

F. $\frac{1}{2}$

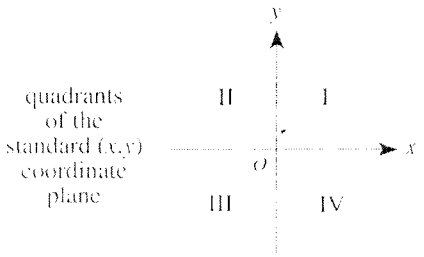
G. $-a^2$

H. a^2

J. $-\frac{1}{a^2}$

K. $\frac{1}{a^2}$

23. If point M has a nonzero x-coordinate and a nonzero y-coordinate and the coordinates have opposite signs, then point M *must* be located in which of the 4 quadrants labeled below?



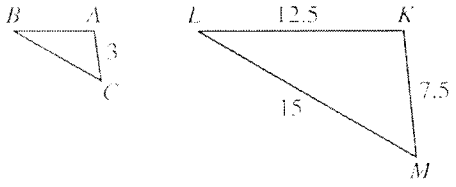
A. I only
B. III only
C. I or III only
D. I or IV only
E. II or IV only

24. The fixed costs of manufacturing basketballs in a factory are \$1,400.00 per day. The variable costs are \$5.25 per basketball. Which of the following expressions can be used to model the cost of manufacturing b basketballs in 1 day?

F. $\$1,405.25b$
G. $\$5.25b - \$1,400.00$
H. $\$1,400.00b + \$5.25$
J. $\$1,400.00 - \$5.25b$
K. $\$1,400.00 + \$5.25b$

25. In the figure below, where $\triangle ABC \sim \triangle KLM$, lengths given are in centimeters. What is the perimeter, in centimeters, of $\triangle ABC$?

(Note: The symbol ~ means "is similar to.")



A. 12

B. 14

C. $21\frac{1}{2}$

D. 35

E. $71\frac{3}{4}$

26. If $\frac{3\sqrt{7}}{a\sqrt{7}} = \frac{3\sqrt{7}}{7}$ is true, then $a = ?$

F. 1

G. $\sqrt{7}$

H. 7

J. 21

K. 49

27. A hot-air balloon 70 meters above the ground is falling at a constant rate of 6 meters per second while another hot-air balloon 10 meters above the ground is rising at a constant rate of 15 meters per second. To the nearest tenth of a second, after how many seconds will the 2 balloons be the same height above the ground?

A. 8.9
B. 6.7
C. 2.9
D. 0.4
E. 0.2

28. A hiking group will go from a certain town to a certain village by van on 1 of 4 roads, from the village to a waterfall by riding bicycles on 1 of 2 bicycle paths, and then from the waterfall to their campsite by hiking on 1 of 6 trails. How many routes are possible for the hiking group to go from the town to the village to the waterfall to their campsite?

F. 6
G. 12
H. 24
J. 48
K. 220

29. Cube A has an edge length of 2 inches. Cube B has an edge length double that of Cube A. What is the volume, in cubic inches, of Cube B ?

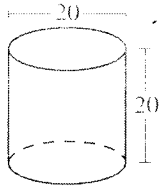
A. 4
B. 8
C. 16
D. 32
E. 64

30. A formula used to compute the current value of a savings account is $A = P(1 + r)^n$, where A is the current value; P is the amount deposited; r is the rate of interest for 1 compounding period, expressed as a decimal; and n is the number of compounding periods. Which of the following is closest to the value of a savings account after 5 years if \$10,000 is deposited at 4% annual interest compounded yearly?

F. \$10,400
G. \$12,167
H. \$42,000
J. \$52,000
K. \$53,782

31. A right circular cylinder is shown in the figure below, with dimensions given in centimeters. What is the total surface area of this cylinder, in square centimeters?

(Note: The total surface area of a cylinder is given by $2\pi r^2 + 2\pi rh$ where r is the radius and h is the height.)



A. 300π
B. 400π
C. 500π
D. 600π
E. $1{,}600\pi$

32. Given $f(x) = 4x + 1$ and $g(x) = x^2 - 2$, which of the following is an expression for $f(g(x))$?

F. $-x^2 + 4x + 1$
G. $x^2 + 4x - 1$
H. $4x^2 - 7$
J. $4x^2 - 1$
K. $16x^2 + 8x - 1$

(17) $y = \frac{2}{3}x - 4$ $\boxed{m_{\parallel} = \frac{2}{3}}$

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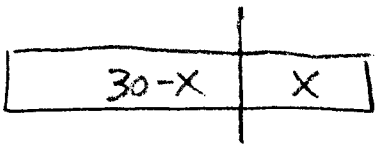
(18) 

$3 : 2$

$\frac{30-x}{x} = \frac{3}{2}$

$3x = 60 - 2x$

$+2x \qquad +2x$

$5x = 60$

$\boxed{x = 12}$

$\therefore 18 : \boxed{12}$

SHORTER PIECE

---

(19) Smallest integer greater than $\sqrt{58}$

$7^2 = 49 \quad 8^2 = 64 \quad \sqrt{58} \approx 7.5$ish

$\therefore \boxed{8}$ smallest integer $> \sqrt{58}$

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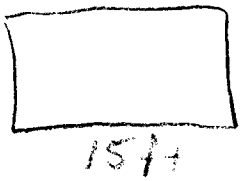
(20) 

4 walls $\Rightarrow 150 \cdot 4 = 600\ ft^2$

1 door $\Rightarrow 3\frac{1}{2} \cdot 7 = 24\frac{1}{2}$ -24.5

1 window $\Rightarrow 3 \cdot 5 = 15$ -15.0

$560.5\ ft^2$

Each gal $\Rightarrow 300 - 350\ ft^2$

$\Rightarrow$ needs $\geq \boxed{2\ \text{GAL}} = \boxed{2\ \text{CANS}}$

(21) $x^2 + 2x = 8$

$x^2 + 2x - 8 = 0$

sum $\Rightarrow b = 2$

prod $\Rightarrow ac = -8$

$-2 \quad +4$

$(x-2)(x+4) = 0 \quad \therefore \boxed{x = \{2, -4\}}$

---

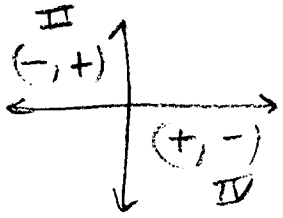
(22) $a > 1 \quad \frac{3a^4}{3a^6} = a^{-2} = \boxed{\frac{1}{a^2}}$

---

(23) $m(x \neq 0, y \neq 0)$, x & y have opposite signs

$\Rightarrow M(-,+)$ or $M(+,-)$

$\Rightarrow$



Quadrants II or IV

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(24) $\boxed{C = 5.25b + 1400}$ or $1400 + 5.25b$

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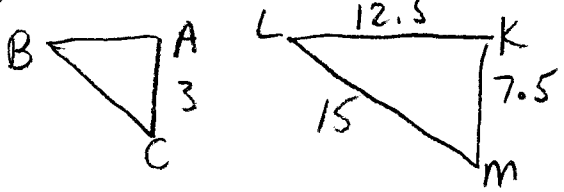
(25) $\triangle ABC \sim \triangle KLM$ Perimeter of $\triangle ABC$?



$\frac{7.5}{3} = \frac{35}{P}$

$7.5P = 105$

$P = \frac{105}{7.5} = \frac{1050}{75} = \frac{210}{15}$

$P = \frac{42}{3} = \boxed{14 = P}$

(26) $\frac{3\sqrt{7}}{a\sqrt{7}} = \frac{3\sqrt{7}}{7}$ $a = ?$

$7(3\sqrt{7}) = 3a \cdot 7$

$3\sqrt{7} = 3a$

$\boxed{\sqrt{7} = a}$

(27) $h_1 = -6\frac{m}{s}t + 70$

$h_2 = +15\frac{m}{s}t + 10$

$-6t + 70 = 15t + 10$

$+6t \quad -10 \qquad +6t \quad -10$

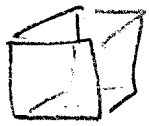
$\frac{60}{21} = \frac{21t}{21}$ $\therefore t = \frac{60}{21} = \frac{20}{7}$

$\boxed{t \sim 2.9 \text{ sec}}$

$7\overline{)20.00}$ → 2.85, 14, 60, 56, 40

(28) $T \overset{(4)}{\Rightarrow} V \overset{(2)}{\Rightarrow} W \overset{(6)}{\Rightarrow} C$

FCP $\Rightarrow 4 \cdot 2 \cdot 6 = \boxed{48 \text{ possible ways}}$

(29) Cube A ⇒  2in

Cube B ⇒ Edge double A: 4in per side

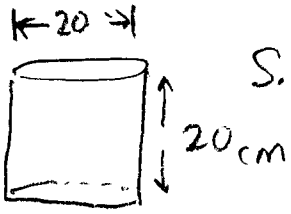
$V = 4^3 = \boxed{64\,in^3}$

(30) $A = P(1+r)^N$

$A = 10000(1.04)^5$ ← years

↑ Yearly rate

$A = 10000(1.21665\ldots) = \boxed{12167}$

(31) 

$\therefore r = 10cm$

S.A. ⇒ $2\pi r^2 + 2\pi rh$

$2\pi(10)^2 + 2\pi(10)(20)$

$2\pi(100 + 200) = \boxed{600\pi\,cm^2}$

(32) $f(x) = 4x+1 \quad g(x) = x^2 - 2$

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

$= 4x^2 - 8 + 1$

$= \boxed{4x^2 - 7}$