Practice Test #12

1. Let a = $\frac{1}{2}$, b = 2, c = 1.

   Evaluate the expression: $\frac{a^{-2}bc^3}{ab^2c^{-1}}$

   A. 3

   B. 4

   C. 5

   D. 5.5

   E. 6

   F. 7

   G. 7.5

   H. 8

2. Imagine a plain, bog-standard clock that reads 5:40. What is the angle formed between the hour and the minute hands?

   A. 70°

   B. 75°

   C. 85°

   D. 90°

   E. 100°

   F. 105°

   G. 120°

   H. 115°

3. Factorise the polynomial: $3x^3$ - $10x^2$ - 8x

   A. x(3x + 1)(x - 4)

   B. x(2x + 2)(x - 4)

   C. x^2(3x + 2)

   D. x^2(x - 4)

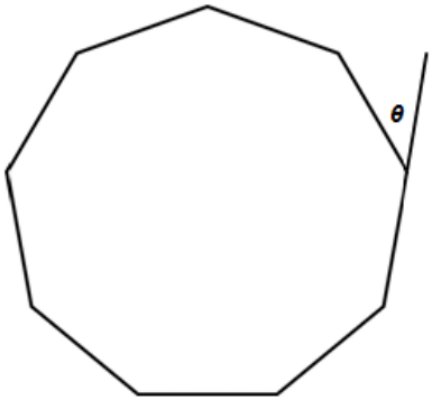
   E. x(3x - 2)(x - 4)

   F. x(3x + 2)(x - 4)

   G. x(3x + 2)(2x - 4)

H. x(3x + 2)(4x - 4)

4. In the regular polygon shown, find the measure of angle θ.



A. 90°

B. 70°

C. 60°

D. 55°

E. 50°

F. 45°

G. 40°

H. 30°

5. A teacher asked her class about their pastimes. Apparently, 35 students liked going to the beach, and 25 students liked visiting the local swimming pool. 6 students liked both, and 3 students liked neither. How many students are there in the class?

A. 51

B. 54

C. 57

D. 60

E. 63

F. 64

G. 66

H. 69

6. A number is decreased by 50% and then increased by 50%. The resulting number is what percent of the original number?

   A. 25%

   B. 40%

   C. 50%

   D. 75%

   E. 85%

   F. 90%

   G. 95%

   H. 105%

7. Simplify: $2\sqrt{50}$ - $3\sqrt{27}$ - $2\sqrt{18}$ + $3\sqrt{12}$

   A. $5\sqrt{2}$ - $3\sqrt{6}$

   B. $6\sqrt{2}$ - $3\sqrt{3}$

   C. $8\sqrt{5}$ + $2\sqrt{3}$

   D. $9\sqrt{2}$ - $7\sqrt{3}$

   E. $5\sqrt{2}$ - $10\sqrt{3}$

   F. $5\sqrt{5}$ + $4\sqrt{3}$

   G. $9\sqrt{2}$ - $3\sqrt{5}$

   H. $4\sqrt{2}$ - $3\sqrt{3}$

8. The total surface area of a cylinder is numerically the same as its volume. The radius of the the cylinder is r cm, the height is h cm. Express h in terms of r. (A cylinder's volume is $\pi r^2 h$, and its surface area is $2\pi rh + 2\pi r^2$.)

   A. h = $\frac{-r}{-r-2}$

   B. h = $\frac{4r}{4r-2}$

   C. h = $\frac{3r}{r-2}$

   D. h = $\frac{r}{3r-2}$

   E. h = $\frac{2r}{r-2}$

   F. h = $\frac{5r}{r-2}$

   G. h = $\frac{r}{2r+2}$

   H. h = $\frac{2r}{r+2}$

9. In the formula P = $2r^2t$: r = 3×10^{-3}, t = 2.5×10^4. Calculate the value of P. Leave your answer in standard form.

   A. 45×10^2

   B. 5×10^{-1}

   C. 50×10^2

   D. 7.5×10^{-3}

   E. 4.5×10^{-4}

   F. 4.5×10^{-1}

   G. 6×10^4

   H. 4×10^2

10. Cristiano Ronaldo has a collection of 5-tenge and 10-tenge coins worth a total of 400 tenge. If he has 50 coins in all, how many 5-tenge coins does Cristiano Ronaldo have?

    A. 20

    B. 21

    C. 22

    D. 23

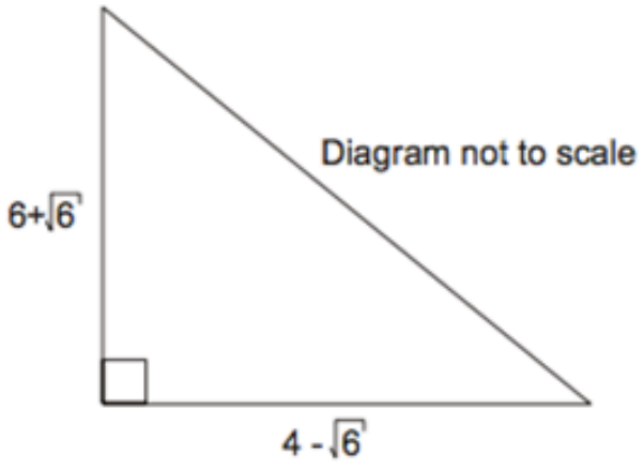
    E. 18

    F. 24

    G. 25

    H. 30

11. A right-angled triangle is shown. Calculate the area of the triangle.



Calculate the area of the triangle.

A. $9 + \sqrt{6}$

B. $9 - \sqrt{6}$

C. $9 - 6\sqrt{5}$

D. $9 - 5\sqrt{6}$

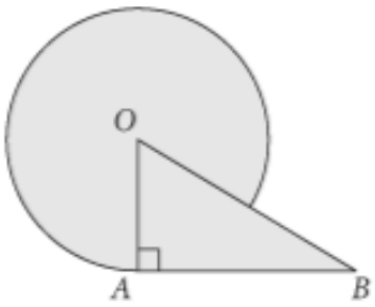
E. $9 + \sqrt{3}$

F. $9 - 3\sqrt{6}$

G. $2 - \sqrt{2}$

H. $18 + \sqrt{6}$

12. In the figure, if radius OA is 8 and the area of right triangle OAB is 32, what is the area of the shaded region? (note that a figure is drawn not to scale)



A. $64\pi + 32$

B. $60\pi + 32$

C. $56\pi + 32$

D. $52\pi + 32$

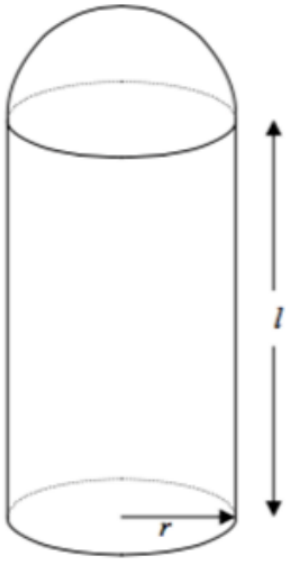
E. $50\pi + 32$

F. $48\pi + 32$

G. $45\pi + 32$

H. $40\pi + 32$

13. The solid shown below consists of a cylinder topped by a hemisphere of the same radius. Which one of the following correctly gives the volume of this solid?



A. $\frac{\pi r^2}{4}(2r - 3l)$

B. $\frac{\pi r^2}{4}(2r + 3l)$

C. $\frac{\pi r^3}{3}(2r + 3l)$

D. $\frac{\pi r^2}{3}(2r + 3l)$

E. $\frac{\pi r^2}{2}(2r + 2l)$

F. $\frac{\pi r^2}{3}(r + 3l)$

G. $\frac{\pi r^2}{3}(2r + 4l)$

H. $\frac{\pi r^2}{5}(r - 3l)$

14. If $3^{n-2} + 3^2 = 36$, find n.

A. 9

B. 7

C. 6

D. 1

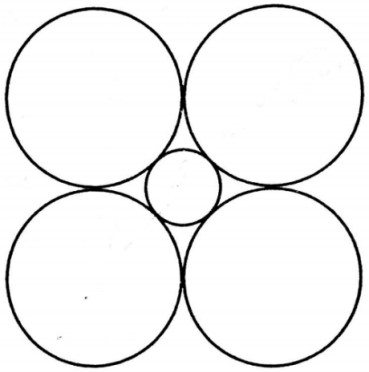
E. 2

F. 3

G. 4

H. 5

15. The total area of the four equal circles in the figure above is 36π, and the circles are all tangent to one another. What is the diameter of the small circle?



A. $4\sqrt{2}$ - 6

B. $6\sqrt{5}$ - 6

C. $5\sqrt{3}$ + 6

D. $8\sqrt{2}$ - 9

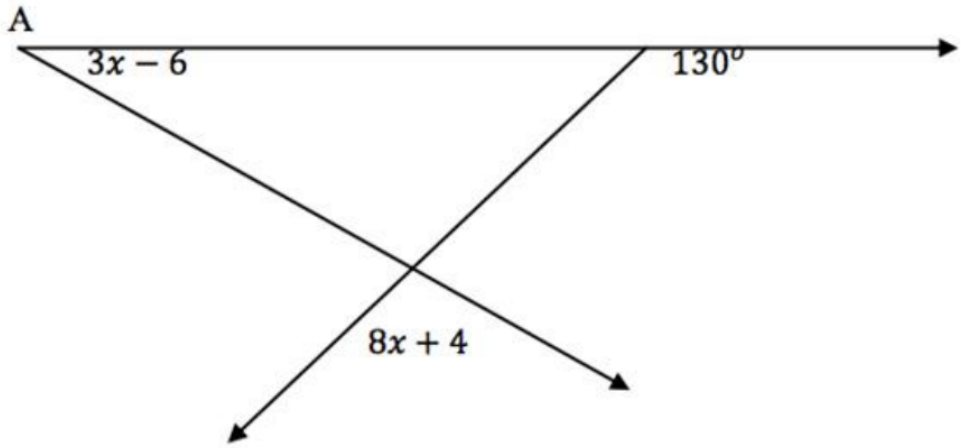
E. $4\sqrt{5}$ + 6

F. $6\sqrt{2}$ - 7

G. $6\sqrt{2}$ - 6

H. $2\sqrt{7}$ + 8

16. Find angle at A.



A. 75°

B. 60°

C. 50°

D. 45°

E. 30°

F. 25°

G. 20°

H. 15°

17. A rectangle with an integer side length has a perimeter 10. What is the greatest number of these rectangles that can be cut from a piece of paper with a width 24 and a length 60?

A. 190

B. 200

C. 210

D. 220

E. 230

F. 240

G. 250

H. 260

18. If $q^p = 4 - qp$ and $p^q = 1$, where p and q are positive integers, what is the value of q?

A. 1

B. 1.5

C. 2

D. 2.5

E. 3

F. 4.5

G. 5

H. 6.5

19. The total cost of 20 identical books is x dollars. At this rate, what is the total cost in dollars of 70 of these books in terms of x?

A. $\frac{x}{2}$

B. $\frac{7x}{2}$

C. $\frac{5x}{3}$

D. $\frac{7x}{4}$

E. $\frac{5x}{2}$

F. $\frac{7x}{5}$

G. $\frac{8x}{3}$

H. $\frac{10x}{3}$

20. At a fancy vegetable stand, Tom bought purple tomatoes for \$8 each and Jerry bought organic giant cabbages \$12 each. In total, they paid \$104 for 10 vegetables. How many cabbages did Jerry buy?

A. 6

B. 5

C. 4

D. 3

E. 2

F. 1

G. 8

H. 7

21. A right circular cone and a sphere have equal volumes. If the cone has a radius x and a height 2x, what is the radius of the sphere?

A. $\frac{3x}{\sqrt[3]{2}}$

B. $\frac{2x}{\sqrt[3]{2}}$

C. $\frac{x}{\sqrt{2}}$

D. $\frac{x}{\sqrt[3]{2}}$

E. $\frac{4x}{\sqrt[2]{7}}$

F. $\frac{6x}{\sqrt[3]{6}}$

G. $\frac{9x}{\sqrt[4]{5}}$

H. $\frac{10x}{\sqrt{3}}$

22. A solid shape is made by joining three cubes together with the largest cube on the bottom and the smallest on the top. Where the faces of two cubes join, the comers of the smaller cube are at the midpoints of the sides of the larger cube. The sides of the smallest cube have a length of 1 cm. What is the total surface area of the shape?

A. 15 cm^2

B. 18 cm^2

C. 21 cm^2

D. 24 cm^2

E. 27 cm^2

F. 30 cm^2

G. 33 cm^2

H. 36 cm^2

23. A right-angled triangle has a hypotenuse of 7x - 3. Its legs are x + 3 and 6x. Find x.

A. 21

B. 9

C. 8

D. 7

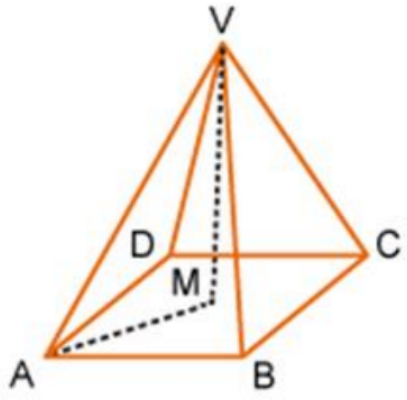
E. 6

F. 5

G. 4

H. 3

24. The square base $ABCD$ has side lengths of 4 cm. Lengths VA, VB, VC and VD are each 8 cm. M is the mid-point of the square base. Work out the vertical height in this square-based pyramid. Which is the correct answer?



A. $\sqrt{14}$

B. $3\sqrt{13}$

C. $2\sqrt{14}$

D. $4\sqrt{10}$

E. $2\sqrt{10}$

F. $2\sqrt{7}$

G. $3\sqrt{5}$

H. $4\sqrt{11}$

25. Simplify: $4 - \frac{17(x^2-9)}{5x^2+17x+6}$

A. $\frac{x-59}{2x-2}$

B. $\frac{4x+59}{5x+2}$

C. $\frac{3x+60}{5x+2}$

D. $\frac{3x-58}{5x-2}$

E. $\frac{3x+59}{4x+2}$

F. $\frac{3x+59}{5x+2}$

G. $\frac{7x+59}{5x-2}$

H. $\frac{8x-59}{5x+3}$

26. The price of a share of company A's stock fell by 20 percent two weeks ago and by another 25 percent last week to its current price. By what percent of the current price does the share need to rise in order to return to its original price?

A. 66%

B. $66\frac{2}{3}\%$

C. 75%

D. $75\frac{1}{3}\%$

E. 80%

F. $80\frac{2}{3}\%$

G. 50%

H. $50\frac{1}{3}\%$

27. * x is defined as the largest even number that is less than the negative square root of x. What is the value of * 81?

A. -10

B. -8

C. -6

D. -4

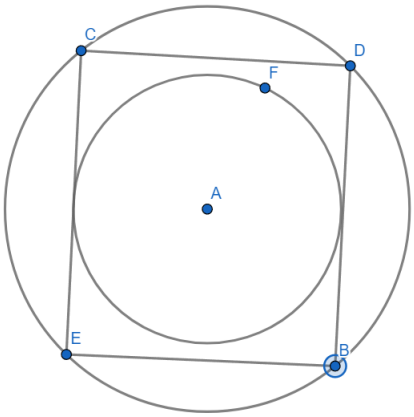
E. -2

F. 0

G. 2

H. 4

28. In the figure, the smaller circle is inscribed in the square and the square is inscribed in the larger circle. If the length of each side of the square is s, what is the ratio of the area of the larger circle to the area of the smaller circle?



A. $2 : 11$

B. $\sqrt{2} : 1$

C. $1 : 2$

D. $2 : 1$

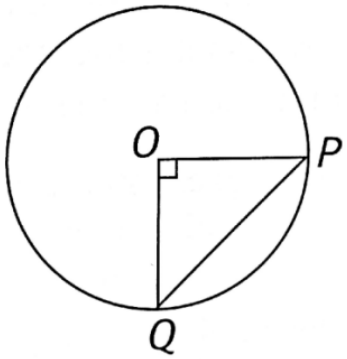
E. $2 : 3$

F. $4 : 3$

G. $3 : 2$

H. $9 : 10$

29. If the length of chord $PQ = 4\sqrt{2}$, what is the circumference of the circle with center O?



A. 5π

B. 6π

C. 7π

D. 8π

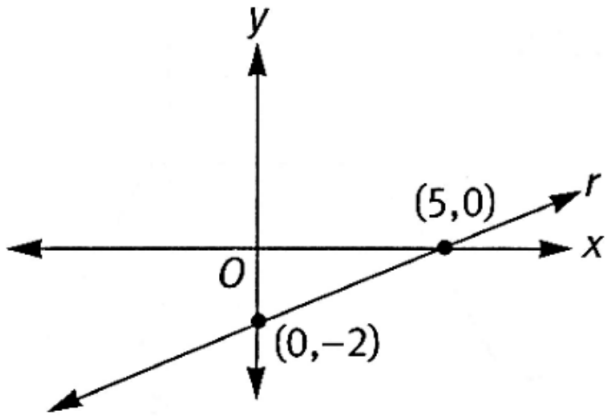
E. 9π

F. 10π

G. 11π

H. 12π

30. Line r is s straight line as shown. Which of the following points lies on line r?



A. (-8, -12)

B. (-4, -6)

C. (10, 3)

D. (10, 2)

E. (4, -2)

F. (14, 2)

G. (20, 0)

H. (12, 4)