

Final Test — Form A

HSN.CN

HSA.APR

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Name _____ Date _____

Algebra 2 final — all topics. Show your work and give exact answers unless told to round.

1. Describe the transformation that takes the parent $f(x) = x^2$ to $g(x) = (x - 4)^2 + 3$.
2. Simplify and write in standard form $a + bi$: $(2 + 5i)(3 - 4i)$.
3. Give the vertex of the parabola $y = -2(x + 1)^2 + 5$ and state whether it opens up or down.
4. Subtract and write in standard form: $(5x^3 + x^2 - 4x + 7) - (2x^3 - 3x^2 + 4x - 1)$.
5. Factor completely: $27x^3 + 8$.
6. Divide using synthetic division: $(2x^3 - 5x^2 + 3x - 4) \div (x - 3)$. Give the quotient and remainder.
7. Evaluate $16^{3/4}$, then rewrite $x^{2/5}$ in radical form.
8. Simplify and state the restriction: $\frac{x^2 - 9x + 20}{x^2 - 16}$.
9. Evaluate the exponential function $f(x) = 3 \cdot 2^x$ at $x = -2$.
10. Evaluate $\log_2 32$, then expand $\log_5(25x)$ using the product property.
11. Find the 15th term and the sum of the first 15 terms of the arithmetic sequence with $a_1 = 15$ and common difference $d = 8$.
12. Which expression is the complete factorization of $x^3 - 5x^2 + 2x - 10$?

A) $(x - 5)(x^2 + 2)$
C) $(x - 5)(x^2 - 2)$

B) $(x + 5)(x^2 - 2)$
D) $(x^2 - 5)(x + 2)$
13. Use the quadratic formula to solve $x^2 - 6x + 13 = 0$. Write the roots in the form $a \pm bi$.

14. Solve and check for extraneous roots: $\sqrt{2x + 7} = x + 2$.

15. Solve and check for extraneous solutions: $\frac{x}{x - 3} = \frac{3}{x - 3} + 4$.

16. Solve $3 \cdot 4^x = 48$.

17. Solve $\log_3(x - 2) = 4$. Check the domain.

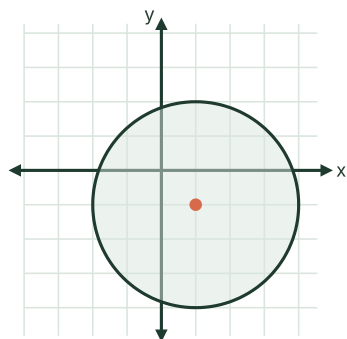
18. Find the sum of the infinite geometric series $24 + 8 + \frac{8}{3} + \frac{8}{9} + \dots$

19. Solve the system.
$$\begin{cases} x^2 + y^2 = 25 \\ y = x - 1 \end{cases}$$

20. Solve the absolute-value inequality and write the answer as a compound statement: $|2x - 5| \leq 9$.

21. A parking garage charges \$8 for up to 3 hours, then \$2 for each additional hour. The cost for t hours is $C(t) = \begin{cases} 8 & 0 < t \leq 3 \\ 8 + 2(t - 3) & t > 3 \end{cases}$. Find $C(2)$ and $C(7)$.

22. Name the center and radius of the circle graphed below, then write its equation.



23. From a club of 9 members, in how many ways can a president, vice-president, and treasurer be chosen? Then, if instead a committee of 4 (no titles) is chosen, how many committees are possible?

24. Which value is exactly equal to $\tan \frac{5\pi}{6}$?

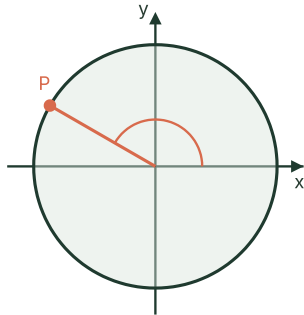
A) $\sqrt{3}$

B) $-\frac{\sqrt{3}}{3}$

C) $\frac{\sqrt{3}}{3}$

D) $-\sqrt{3}$

25. Give the exact coordinates $(\cos \theta, \sin \theta)$ of the point on the unit circle at $\theta = \frac{5\pi}{6}$ shown below.



26. You deposit \$5000 in an account that pays 4% annual interest compounded quarterly. Using $A = P \left(1 + \frac{r}{n}\right)^{nt}$ with $P = \$5000$, $r = 0.04$, $n = 4$, find the balance after 3 years, rounded to the nearest cent.

27. On the first day of a savings challenge you set aside \$1, and each day after you set aside twice the previous day's amount (\$1, \$2, \$4, \$8, ...). What is the total amount saved after 12 days?

28. A new car is bought for \$28,000 and loses 15% of its value each year, so its value after t years is $V = 28000 \cdot (0.85)^t$. How many years until the car is first worth less than \$14,000 (half its purchase price)? Use $\frac{\ln 0.5}{\ln 0.85} \approx 4.27$.