Answer Key — Practice Test 2

#	Ans	Category	#	Ans	Category	#	Ans	Category
1	B	Integrating Essential Skills	16	J	Integrating Essential Skills	31	D	Geometry
2	H	Integrating Essential Skills	17	C	Algebra	32	G	Statistics & Probability
3	C	Algebra	18	F	Number & Quantity	33	B	Functions
4	H	Integrating Essential Skills	19	B	Functions	34	J	Statistics & Probability
5	C	Integrating Essential Skills	20	H	Integrating Essential Skills	35	C	Integrating Essential Skills
6	J	Statistics & Probability	21	D	Algebra	36	H	Geometry
7	A	Algebra	22	J	Geometry	37	D	Integrating Essential Skills
8	G	Number & Quantity	23	A	Algebra	38	F	Functions
9	B	Geometry	24	J	Number & Quantity	39	A	Functions
10	J	Algebra	25	C	Integrating Essential Skills	40	H	Functions
11	B	Functions	26	G	Geometry	41	B	Algebra
12	H	Functions	27	C	Geometry	42	J	Functions
13	D	Geometry	28	H	Statistics & Probability	43	A	Geometry
14	F	Statistics & Probability	29	C	Number & Quantity	44	F	Statistics & Probability
15	C	Geometry	30	F	Number & Quantity	45	A	Algebra

Your results by category

Category	Questions	Share of test	Your number correct
Preparing for Higher Math	**36**	**80%**	**/ 36**
Number & Quantity Questions 8, 18, 24, 29, 30	5	11%	/ 5
Algebra Questions 3, 7, 10, 17, 21, 23, 41, 45	8	18%	/ 8
Functions Questions 11, 12, 19, 33, 38, 39, 40, 42	8	18%	/ 8
Geometry Questions 9, 13, 15, 22, 26, 27, 31, 36, 43	9	20%	/ 9
Statistics & Probability Questions 6, 14, 28, 32, 34, 44	6	13%	/ 6
Integrating Essential Skills Questions 1, 2, 4, 5, 16, 20, 25, 35, 37	**9**	**20%**	**/ 9**
Total	**45**	**100%**	**/ 45**

Answer Explanations — Practice Test 2

1. B Integrating Essential Skills · Easy

Trapezoid area $= \frac{1}{2}(b_1 + b_2)h = \frac{1}{2}(24 + 38)(15) = \frac{1}{2}(62)(15) = 465$. (930 forgets the $\frac{1}{2}$.)

2. H Integrating Essential Skills · Easy

Store A: $6(12) = 72$. Store B: $2(33) = 66$. Store C: each group of 3 costs $13 + 13 + 6.50 = 32.50$, so 6 shirts cost 65. Store D: 70. Store C is lowest at \$65.

3. C Algebra · Easy

FOIL: $3k^2 - 2km + 6km - 4m^2 = 3k^2 + 4km - 4m^2$.

4. H Integrating Essential Skills · Easy

Mean $= \frac{48+36+27+21}{4} = \frac{132}{4} = 33$ inches. (31.5 is the median.)

5. C Integrating Essential Skills · Medium

Regular pay: $40(16) = 640$. Overtime rate: $1.5(16) = 24$ per hour, for 7 hours: 168. Total: $640 + 168 = 808$. (\$1,128 pays all 47 hours at the overtime rate.)

6. J Statistics & Probability · Medium

After a senior is chosen, 14 students remain, and 5 of them are seniors. The probability is $\frac{5}{14}$. ($\frac{1}{3} = \frac{5}{15}$ forgets that one student has already been removed from the total.)

7. A Algebra · Medium

Distribute: $8w + 12 = 6w - 9$. Subtract $6w$ and 12: $2w = -21$, so $w = -10.5$.

8. G Number & Quantity · Medium

$\sqrt{75} = 5\sqrt{3}$, $2\sqrt{12} = 2(2\sqrt{3}) = 4\sqrt{3}$, and $\frac{\sqrt{27}}{3} = \frac{3\sqrt{3}}{3} = \sqrt{3}$. Total: $5\sqrt{3} - 4\sqrt{3} + \sqrt{3} = 2\sqrt{3}$.

9. B Geometry · Medium

Area to carpet: $18(12) - 6(4) = 216 - 24 = 192$ square feet. Cost: $192(3.25) = 624$. (\$702 carpets the full room.)

10. J Algebra · Medium

Let s be the number of sopranos. Then $s + (2s + 3) = 168$, so $3s = 165$, $s = 55$, and altos $= 113$. The ratio of altos to sopranos is $113 : 55$.

11. B Functions · Medium

$3 \cdot 2^{x-1} - 5 = 43$, so $3 \cdot 2^{x-1} = 48$ and $2^{x-1} = 16 = 2^4$. Then $x - 1 = 4$ and $x = 5$.

12. H Functions · Medium

The square root requires $t - 2 \geq 0$, so $t \geq 2$. The denominator can't be 0, so $t \neq 5$. Both conditions apply: $t \geq 2$ and $t \neq 5$. ($t = 2$ is allowed: $f(2) = 0$.)

13. D Geometry · Medium

He walked $9 + 4 + 15 + 6 = 34$ yards. Overall, he moved 24 yards east and 10 yards north, so the straight-line distance is $\sqrt{24^2 + 10^2} = \sqrt{676} = 26$. Difference: $34 - 26 = 8$ yards.

14. F Statistics & Probability · Medium

$-1.25 = \dfrac{x - 72}{8}$, so $x - 72 = -10$ and $x = 62$.

15. C Geometry · Medium

Base angles of an isosceles triangle are equal: $\angle B = \angle ACB = \frac{180^\circ - 40^\circ}{2} = 70^\circ$. $\angle ACD$ is supplementary to $\angle ACB$: $180^\circ - 70^\circ = 110^\circ$.

16. J Integrating Essential Skills · Medium

The points within 3 units of the center form a circle with area $\pi(3^2) = 9\pi \approx 28.27$, which fits entirely inside the square (area 100). Probability $= \frac{9\pi}{100} \approx 0.28$.

17. C Algebra · Medium

$3x - 4y = 12$ has slope $\frac{3}{4}$, so a perpendicular line has slope $-\frac{4}{3}$. $y + 1 = -\frac{4}{3}(x - 6)$ gives $y = -\frac{4}{3}x + 8 - 1 = -\frac{4}{3}x + 7$. The y-intercept is 7.

18. F Number & Quantity · Medium

The block 318427 has 6 digits. $500 = 6(83) + 2$, so the 500th digit is the 2nd digit of the block, which is 1.

19. B Functions · Medium

Each y-value is 1.6 times the previous one ($8/5 = 12.8/8 = 20.48/12.8 = 1.6$), and $y = 5$ when $x = 0$. So $y = 5(1.6)^x$. ($y = 5 + 3x$ matches only the first two rows.)

20. H Integrating Essential Skills · Medium

$\frac{9}{45} = \frac{1}{5}$ of the sample is tagged, so the 60 tagged fish are about $\frac{1}{5}$ of the population: $60 \times 5 = 300$.

21. D Algebra · Medium

Test $(2, 2)$: $2 + 4 = 6 \leq 6$ ✓ and $2 > 2(2) - 3 = 1$ ✓. $(4, 1)$ fails $1 > 5$. $(3, 2)$ fails $7 \leq 6$. $(-2, 5)$ fails $8 \leq 6$.

22. J Geometry · Medium

A regular hexagon is made of 6 equilateral triangles. Each has area $\frac{\sqrt{3}}{4}(6^2) = 9\sqrt{3}$, so the hexagon's area is $6(9\sqrt{3}) = 54\sqrt{3}$.

23. A Algebra · Medium

Subtracting a negative adds its size, so $p - n = |p| + |n|$, which is the largest. $p + n = |p| - |n|$ is smaller, and both $n - p$ and $|n| - |p|$ are negative. (Try $p = 3$, $n = -2$: 5, 1, -5, -1.)

24. J Number & Quantity · Medium

Row 1: $(3)(-2)+(-1)(4)=-10$; $(3)(3)+(-1)(-1)=10$. Row 2: $(0)(-2)+(4)(4)=16$; $(0)(3)+(4)(-1)=-4$. The first choice multiplies matching entries, which isn't how matrix multiplication works.

25. C Integrating Essential Skills · Medium

Let Jo sell j. Then $j+3j+(3j+4)=60$, so $7j=56$ and $j=8$. Lena sold 24, and Ray sold $24+4=28$.

26. G Geometry · Medium

The longest rod runs along the space diagonal: $\sqrt{3^2+4^2+12^2}=\sqrt{9+16+144}=\sqrt{169}=13$.

27. C Geometry · Medium

Arc length $=\frac{140}{360}(2\pi\cdot 9)=7\pi$. The perimeter also includes the two radii: $9+9+7\pi=18+7\pi$. (31.5π is the sector's area.)

28. H Statistics & Probability · Medium

P(lose) $=1-\frac{1}{8}-\frac{3}{8}=\frac{1}{2}$. Expected value: $10\left(\frac{1}{8}\right)+2\left(\frac{3}{8}\right)-3\left(\frac{1}{2}\right)=1.25+0.75-1.50=0.50$.

29. C Number & Quantity · Medium

Numerator: $6.4\times 2.5=16$ and $10^5\times 10^{-8}=10^{-3}$, so 16×10^{-3}. Divide: $\frac{16}{8}=2$ and $\frac{10^{-3}}{10^{-4}}=10^1$. Result: $2\times 10^1=20$.

30. F Number & Quantity · Hard

Multiply the numerator and denominator by the conjugate $2+i$: $\dfrac{(5+i)(2+i)}{(2-i)(2+i)}=\dfrac{10+5i+2i+i^2}{4+1}=\dfrac{9+7i}{5}$.

31. D Geometry · Hard

$\tan A=\frac{\text{opposite}}{\text{adjacent}}=\frac{5}{12}$. Double-angle formula: $\tan 2A=\dfrac{2\tan A}{1-\tan^2 A}=\dfrac{10/12}{1-25/144}=\dfrac{10}{12}\cdot\dfrac{144}{119}=\dfrac{120}{119}$. ($\frac{5}{6}$ simply doubles $\tan A$.)

32. G Statistics & Probability · Hard

Mean: $547/7\approx 78.1$ rises to $642/8=80.25$. Median: 81 becomes $\frac{81+81}{2}=81$ (no change). Mode: still 81. Range: $94-58=36$ becomes $95-58=37$. Only the mean and the range increase.

33. B Functions · Hard

$f^{-1}(5)$ is the input that gives $f(x)=5$. Solve $\dfrac{2x+3}{x-1}=5$: $2x+3=5x-5$, so $3x=8$ and $x=\frac{8}{3}$. ($\frac{13}{4}=f(5)$, which is not the inverse.)

34. J Statistics & Probability · Hard

With the condition: $0.02(5{,}000)=100$; true positives $=0.95(100)=95$. Without: $4{,}900$; false positives $=0.04(4{,}900)=196$. Total positives: 291. $P(\text{no condition}\mid\text{positive})=\frac{196}{291}\approx 0.674$. (0.326 is the chance the person does have the condition.)

35. C Integrating Essential Skills · Hard

Combined rate: $\frac{1}{6}+\frac{1}{9}-\frac{1}{12}=\frac{6+4-3}{36}=\frac{7}{36}$ tank per hour. Time: $\frac{36}{7}\approx 5.14$ hours. ($\frac{18}{5}$ ignores the drain.)

36. H Geometry · Hard

The perpendicular from the center bisects a chord. For $\overline{AB}$: $r=\sqrt{8^2+6^2}=10$. For $\overline{CD}$: half its length is $\sqrt{10^2-8^2}=6$, so $CD=12$.

37. D Integrating Essential Skills · Hard

In inches, the floor is 96 by 132. Along 96 in: $96/18=5.\overline{3}$, so 6 tiles are needed. Along 132 in: $132/18=7.\overline{3}$, so 8 tiles. Total: $6\times 8=48$. (Dividing areas gives about 39.1, or 40 tiles, which only works if cut pieces could be reused.)

38. F Functions · Hard

Amplitude: $\frac{1-(-3)}{2}=2$. Midline: $\frac{1+(-3)}{2}=-1$. From a maximum to the next minimum is half a period, so the period is 4, and $\frac{2\pi}{b}=4$ gives $b=\frac{\pi}{2}$. So $y=2\cos\left(\frac{\pi}{2}x\right)-1$.

39. A Functions · Hard

$f(g(x))=(|x|-1)^2-9=0$, so $|x|-1=3$ or $|x|-1=-3$. Then $|x|=4$ (so $x=\pm 4$) or $|x|=-2$ (impossible). The solutions are -4 and 4.

40. H Functions · Hard

We need $0.85^t<0.5$. $0.85^4\approx 0.522$ (still above half) and $0.85^5\approx 0.444$ (below half). So the value first drops below \$14,000 at the end of the 5th year.

41. B Algebra · Hard

$18x^2-3x-10=0$ factors as $(6x-5)(3x+2)=0$, so $x=\frac{5}{6}$ or $x=-\frac{2}{3}$. The greater solution is $\frac{5}{6}$. (Quadratic formula: $x=\frac{3\pm\sqrt{9+720}}{36}=\frac{3\pm 27}{36}$.)

42. J Functions · Hard

Combine: $\log_3[x(x+6)]=3$, so $x^2+6x=27$, and $(x+9)(x-3)=0$. Since the logarithm of a negative number is undefined, $x=-9$ is rejected. The solution set is $\{3\}$.

43. A Geometry · Hard

In Quadrant II, cosine is negative: $\cos\theta=-\frac{4}{5}$. $\sin 2\theta=2\sin\theta\cos\theta=2\left(\frac{3}{5}\right)\left(-\frac{4}{5}\right)=-\frac{24}{25}$. ($\frac{24}{25}$ ignores the sign of cosine.)

44. F Statistics & Probability · Hard

Inclusion–exclusion: $70 + 55 + 40 - 25 - 18 - 15 + 8 = 115$ students take at least one language. None: $120 - 115 = 5$. (Forgetting to add back the 8 students in all three gives 13.)

45. A Algebra · Hard

I: $a > b > 0$, so $|a| = a > b = |b|$. Always true. II: c can be negative and large, e.g., $c = -10$ gives $|c| > |b|$. Not always true. III: $ac < bc$ means $c(a - b) < 0$, which requires $c < 0$; but c could be positive (e.g., $a = 3, b = 2, c = 1$). Not always true. Only I.