A2.N.5: Rationalizing Denominators 1: Rationalize a denominator containing a radical expression

1. The expression \( \frac{3 - \sqrt{8}}{\sqrt{3}} \) is equivalent to
   1) \( \frac{\sqrt{3} - 2\sqrt{6}}{\sqrt{3}} \)
   2) \( -\sqrt{3} + \frac{2}{3}\sqrt{6} \)
   3) \( \frac{3 - \sqrt{24}}{3} \)
   4) \( \sqrt{3} - \frac{2}{3}\sqrt{6} \)

2. Which expression is equivalent to \( \frac{4}{3 + \sqrt{2}} \)?
   1) \( \frac{12 + 4\sqrt{2}}{7} \)
   2) \( \frac{12 + 4\sqrt{2}}{11} \)
   3) \( \frac{12 - 4\sqrt{2}}{7} \)
   4) \( \frac{12 - 4\sqrt{2}}{11} \)

3. The expression \( \frac{7}{2 - \sqrt{3}} \) is equivalent to
   1) \( 14 - 7\sqrt{3} \)
   2) \( 14 + 7\sqrt{3} \)
   3) \( \frac{2 + \sqrt{3}}{7} \)
   4) \( \frac{14 + \sqrt{3}}{7} \)

4. The expression \( \frac{11}{\sqrt{3} - 5} \) is equivalent to
   1) \( \frac{-\sqrt{3} - 5}{2} \)
   2) \( \frac{-\sqrt{3} + 5}{2} \)
   3) \( \frac{\sqrt{3} - 5}{2} \)
   4) \( \frac{\sqrt{3} + 5}{2} \)

5. The expression \( \frac{7}{3 - \sqrt{2}} \) is equivalent to
   1) \( \frac{3 + \sqrt{2}}{7} \)
   2) \( \frac{21 + \sqrt{2}}{7} \)
   3) \( 3 + \sqrt{2} \)
   4) \( 3 - \sqrt{2} \)

6. The expression \( \frac{1}{5 - \sqrt{13}} \) is equivalent to
   1) \( \frac{5 + \sqrt{13}}{12} \)
   2) \( \frac{5 + \sqrt{13}}{-12} \)
   3) \( \frac{5 + \sqrt{13}}{8} \)
   4) \( \frac{5 + \sqrt{13}}{-8} \)
7 The expression $\frac{5}{\sqrt{5} - 1}$ is equivalent to

1) $\frac{5}{4}$
2) $\frac{5\sqrt{5} + 5}{4}$
3) $\frac{5\sqrt{5} - 5}{4}$
4) $\frac{5\sqrt{5} - 5}{6}$

8 The expression $\frac{12}{3 + \sqrt{3}}$ is equivalent to

1) $12 - \sqrt{3}$
2) $6 - 2\sqrt{3}$
3) $4 - 2\sqrt{3}$
4) $2 + \sqrt{3}$

9 The expression $\frac{4}{5 - \sqrt{13}}$ is equivalent to

1) $\frac{4\sqrt{13}}{5\sqrt{13} - 13}$
2) $\frac{4(5 - \sqrt{13})}{38}$
3) $\frac{5 + \sqrt{13}}{3}$
4) $\frac{4(5 + \sqrt{13})}{38}$

10 The fraction $\frac{3}{\sqrt{6} - 1}$ is equivalent to

1) $3\sqrt{6} + 3$
2) $3\sqrt{6} - 3$
3) $\frac{3\sqrt{6} + 3}{5}$
4) $\frac{3\sqrt{6} - 3}{5}$

11 The expression $\frac{2}{1 - \sqrt{3}}$ is equivalent to

1) $1 + \sqrt{3}$
2) $1 - \sqrt{3}$
3) $-1 + \sqrt{3}$
4) $-1 - \sqrt{3}$

12 The expression $\frac{5}{3 + \sqrt{2}}$ is equivalent to

1) $\frac{\sqrt{2} - 15}{3}$
2) $\frac{5\sqrt{2} - 15}{5}$
3) $\frac{15 - 5\sqrt{2}}{7}$
4) $15 - 5\sqrt{2}$
13 The expression \( \frac{1}{7 - \sqrt{11}} \) is equivalent to

1) \( \frac{7 + \sqrt{11}}{38} \)
2) \( \frac{7 - \sqrt{11}}{38} \)
3) \( \frac{7 + \sqrt{11}}{60} \)
4) \( \frac{7 - \sqrt{11}}{60} \)

14 The expression \( \frac{5}{4 - \sqrt{11}} \) is equivalent to

1) \( \frac{4 + \sqrt{11}}{20 + 5\sqrt{11}} \)
2) \( \frac{4 - \sqrt{11}}{20 - 5\sqrt{11}} \)
3) \( \frac{4 + \sqrt{11}}{27} \)
4) \( \frac{4 - \sqrt{11}}{27} \)

15 Which expression is equivalent to \( \frac{\sqrt{3} + 5}{\sqrt{3} - 5} \)?

1) \( \frac{14 + 5\sqrt{3}}{11} \)
2) \( \frac{17 + 5\sqrt{3}}{11} \)
3) \( \frac{14 + 5\sqrt{3}}{14} \)
4) \( \frac{17 + 5\sqrt{3}}{14} \)

16 Which expression is equal to \( \frac{2 + \sqrt{3}}{2 - \sqrt{3}} \)?

1) \( \frac{1 - 4\sqrt{3}}{7} \)
2) \( \frac{7 + 4\sqrt{3}}{7} \)
3) \( 1 - 4\sqrt{3} \)
4) \( 7 + 4\sqrt{3} \)

17 The expression \( \frac{5 + \sqrt{7}}{5 - \sqrt{7}} \) is equivalent to

1) \( \frac{16 + 5\sqrt{7}}{16} \)
2) \( \frac{16 + 5\sqrt{7}}{9} \)
3) \( \frac{16 - 5\sqrt{7}}{16} \)
4) \( \frac{16 - 5\sqrt{7}}{9} \)

18 Which expression is equivalent to \( \frac{\sqrt{7} + \sqrt{2}}{\sqrt{7} - \sqrt{2}} \)?

1) \( \frac{9}{5} \)
2) \( -1 \)
3) \( \frac{9 + 2\sqrt{14}}{5} \)
4) \( \frac{11 + \sqrt{2}}{14} \)
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Answer Section

1  ANS: 4
\[
\frac{3-\sqrt{8}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{3} - \sqrt{24}}{\sqrt{3}} = \frac{3\sqrt{3} - 2\sqrt{6}}{\sqrt{3}} = \sqrt{3} - \frac{2}{3}\sqrt{6}
\]

REF: 081518a2

2  ANS: 3  REF: 060305b
3  ANS: 2  REF: 010405b
4  ANS: 1  REF: 080420b
5  ANS: 3  REF: 010516b
6  ANS: 1  REF: 080506b
7  ANS: 2  REF: 010613b
8  ANS: 2  REF: 080606b
9  ANS: 3
\[
\frac{4}{5-\sqrt{13}} \cdot \frac{5+\sqrt{13}}{5+\sqrt{13}} = \frac{4(5+\sqrt{13})}{25-13} = \frac{5+\sqrt{13}}{3}
\]

REF: 061116a2

10 ANS: 3  REF: 060709b
11 ANS: 4  REF: 080716b
12 ANS: 3  REF: 010902b
13 ANS: 1
\[
\frac{1}{7-\sqrt{11}} \cdot \frac{7+\sqrt{11}}{7+\sqrt{11}} = \frac{7+\sqrt{11}}{49-11} = \frac{7+\sqrt{11}}{38}
\]

REF: 011404a2

14 ANS: 1
\[
\frac{5}{4-\sqrt{11}} \cdot \frac{4+\sqrt{11}}{4+\sqrt{11}} = \frac{5(4+\sqrt{11})}{16-11} = \frac{5(4+\sqrt{11})}{5} = 4 + \sqrt{11}
\]

REF: 061509a2

15 ANS: 1
\[
\frac{\sqrt{3} + 5}{\sqrt{3} - 5} \cdot \frac{\sqrt{3} + 5}{\sqrt{3} + 5} = \frac{3 + 5\sqrt{3} + 5\sqrt{3} + 25}{3 - 25} = \frac{28 + 10\sqrt{3}}{-22} = \frac{14 + 5\sqrt{3}}{11}
\]

REF: 061012a2

16 ANS: 4  REF: 080307b
17 ANS: 2  REF: 060905b
18 ANS: 3  REF: fall9906b