1.10 Surds

Student name: _____ Score: _____

1. Simplify.

$$\sqrt{98}-\sqrt{50}+\sqrt{8}$$

..... [2]

2. **(a)** Simplify $\sqrt{72}-\sqrt{50}$.

Answer(a) ..... [2]

(b) Write $\dfrac{1}{2-\sqrt{3}}$ in its simplest form by rationalising the denominator.

Answer(b) ..... [2]

3. Simplify.

$$\sqrt{12}$$

..... [2]

4. **(a)** Simplify $\sqrt{75}$.

Answer(a) ..... [1]

(b) Simplify $\dfrac{2}{5-\sqrt{3}}$ by rationalising the denominator.

Answer(b) ..... [2]

5. **(a)** Simplify $8\sqrt{2}+2\sqrt{8}$.

Answer(a) ..... [2]

(b) Simplify by rationalising the denominator.

$$\frac{3\sqrt{2}}{3-\sqrt{2}}$$

Answer(b) ..... [2]

6. Rationalise the denominator in each of the following.

(a) $\frac{2}{\sqrt{3}}$

Answer(a) ..... [1]

(b) $\frac{1}{\sqrt{3}-1}$

Answer(b) ..... [2]

7. Simplify.

(a) $\sqrt{50} + \sqrt{8}$

Answer(a) ..... [2]

(b) $\left(5+\sqrt{3}\right)^2$

Answer(b) ..... [2]

8. (a) Simplify.

$\sqrt{200} - \sqrt{98}$

Answer(a) ..... [2]

(b) Rationalise the denominator.

$\frac{11}{5-\sqrt{3}}$

Answer(b) ..... [3]

9. (a) Simplify.

$\sqrt{75} - \sqrt{27}$

Answer(a) ..... [2]

(b) Rationalise the denominator.

$\frac{7}{5-\sqrt{2}}$

Answer(b) ..... [2]

10. Write each set of numbers in order starting with the smallest.

(a) $\frac{1}{3}$ 0.3 $\sqrt{0.3}$ 0.29 33%

Answer(a) ..... (smallest) , ... , ... , ... , ... [2]

(b) $2\sqrt{5}$ $\frac{\sqrt{5}}{2}$ $\left(\sqrt{5}\right)^3$ $\frac{5}{\sqrt{5}}$

Answer(b) ..... (smallest) , ... , ... , ... [2]

11. **(a)** Simplify $(3\sqrt{2}-2)(2\sqrt{2}+1)$.

Answer(a) ..... [3]

(b) Rationalise the denominator of $\frac{10}{\sqrt{5}}$.

Answer(b) ..... [2]

12. **(a)** Simplify.

$$\sqrt{27}+\sqrt{147}$$

Answer(a) ..... [2]

(b) Rationalise the denominator.

$$\frac{3-\sqrt{5}}{3+\sqrt{5}}$$

Answer(b) ..... [3]

13. Simplify $(5+\sqrt{3})^2$.

Answer ..... [2]

14. Rationalise the denominator.

$$\frac{1}{\sqrt{7}}$$

..... [1]

15. Rationalise the denominator.

$$\frac{5}{\sqrt{2}+1}$$

..... [2]

16. **(a)** Simplify.

$$\sqrt{3}(4\sqrt{12}-7\sqrt{3})$$

..... [2]

(b) Rationalise the denominator.

$$\frac{7}{3-\sqrt{2}}$$

..... [2]

17. Simplify $\sqrt{75}$.

Answer(a) ..... [2]

18. **(a)** Simplify $\sqrt{125}$.

Answer(a) ..... [1]

(b) Simplify $\frac{1}{\sqrt{6}-\sqrt{3}}$ by rationalising the denominator.

Answer(b) ..... [2]

19. Simplify the following.

(a) $\sqrt{32}$

Answer(a) ..... [1]

(b) $\dfrac{1}{\sqrt{2}+1}$

Answer(b) ..... [2]

20. **(a)** Simplify $\sqrt{72}$.

Answer(a) ..... [1]

(b) $\dfrac{\sqrt{2}+2}{\sqrt{2}-1} = p+q\sqrt{2}$

Find the values of p and q.

Answer(b) $p =$ .....

$q =$ ..... [3]

21. $\dfrac{3}{\sqrt{2}+1} = a\sqrt{2}+b$

Find the values of a and b.

Answer $a =$ .....

$b =$ ..... [3]

22. By rationalising the denominator, simplify

$$\frac{12}{\sqrt{6}-2}.$$

..... [3]

23. Multiply out the brackets and simplify.

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

..... [2]

24. **(a)** Simplify.

$$(4-\sqrt{3})(4+\sqrt{3})$$

..... [2]

(b) Rationalise the denominator.

$$\frac{5}{\sqrt{7}}$$

..... [1]

25. $p = 5+2\sqrt{3}$ $q = 5-2\sqrt{3}$

Find p^2-q^2, writing your answer in its simplest form.

..... [3]

26. **(a)** Simplify fully.

$$\sqrt{700}$$

..... [1]

(b) Rationalise the denominator.

$$\frac{1}{7-\sqrt{2}}$$

..... [2]

27. Simplify.

$$\sqrt{75}-\sqrt{12}+\sqrt{27}$$

..... [2]

28. Rationalise the denominator.

$$\frac{1}{\sqrt{5}-1}$$

..... [2]

29. Rationalise the denominator.

$$\frac{9}{\sqrt{7}-2}$$

..... [2]

30. Expand and simplify $(2\sqrt{3}-5)(4+\sqrt{3})$.

..... [2]

31. Simplify by rationalising the denominator. $\dfrac{3}{2\sqrt{2}-1}$

..... [2]

32. **(a)** Simplify fully.

$$\sqrt{75}-\sqrt{48}+\sqrt{12}$$

..... [2]

(b) Rationalise the denominator, giving your answer in its simplest form.

$$\frac{1}{\sqrt{3}+5}$$

..... [2]

33. **(a)** Expand the brackets and simplify.

$$(\sqrt{a}+\sqrt{b})(\sqrt{a}-\sqrt{b})$$

..... [2]

(b) Rationalise the denominator.

$$\frac{1}{\sqrt{7}+\sqrt{6}}$$

..... [1]

(c) Work out the value of

$$\frac{1}{\sqrt{9}+\sqrt{8}}+\frac{1}{\sqrt{8}+\sqrt{7}}+\frac{1}{\sqrt{7}+\sqrt{6}}+\frac{1}{\sqrt{6}+\sqrt{5}}+\frac{1}{\sqrt{5}+\sqrt{4}}.$$

..... [2]

34. Simplify.

(a) $\frac{12}{\sqrt{2}}$

..... [2]

(b) $(5-2\sqrt{3})^2$

..... [3]

35. In each of the following, rationalise the denominator and simplify your answer.

(a) $\frac{6}{\sqrt{3}}$

..... [2]

(b) $\frac{\sqrt{3}}{2+\sqrt{3}}$

..... [2]

36. Rationalise the denominator and simplify.

$$\frac{14\sqrt{2}}{3+\sqrt{2}}$$

..... [3]

37. **(a)** Simplify $\sqrt{18}+\sqrt{72}$.

..... [2]

(b) Rationalise the denominator.

$$\frac{1}{\sqrt{5}+2}$$

..... [2]

38. Rationalise the denominator and simplify your answer.

$$\frac{32}{\sqrt{8}}$$

..... [2]

39. Simplify.

$$\sqrt{32} - \sqrt{72} + \sqrt{50}$$

..... [2]

40. Rationalise the denominator, giving your answer in its simplest form.

$$\frac{5+\sqrt{3}}{5-\sqrt{3}}$$

..... [3]

41. Simplify.

$$(5+2\sqrt{3})^2$$

..... [3]

42. (a) Simplify $\sqrt{98}$.

..... [1]

(b) Rationalise the denominator.

$$\frac{1}{3-\sqrt{5}}$$

..... [2]

43. (a) Simplify $\sqrt{20} + \sqrt{125}$.

..... [2]

(b) Rationalise the denominator and simplify your answer.

$$\frac{18}{\sqrt{7}-1}$$

..... [2]

44. (a) Simplify.

$$\sqrt{300} - \sqrt{27}$$

..... [2]

(b) Rationalise the denominator and simplify your answer.

$$\frac{14}{3-\sqrt{2}}$$

..... [3]

45. Expand and simplify.

$$(3\sqrt{2}+7)^2$$

..... [3]

46. $\left(2\sqrt{3}-3\sqrt{2}\right)^2 = p+q\sqrt{6}$

Find the value of p and the value of q.

$p =$ .....

$q =$ ..... [3]

47. Simplify.

$$\sqrt{125}+\sqrt{80}$$

..... [2]

48. (a) Simplify.

$$\sqrt{75}-\sqrt{27}$$

..... [2]

(b) Rationalise the denominator and simplify your answer.

$$\frac{10}{5-\sqrt{5}}$$

..... [3]

49. Rationalise the denominator.

$$\frac{5}{\sqrt{3}-\sqrt{2}}$$

..... [2]