Answers to Complex Number Packet

1. $110i$	2. $6i\sqrt{2}$
3. $45i\sqrt{2}$	4. $28i\sqrt{6}$
5. i	6. 1
7. $-i$	8. -1
9. $8-3i$	10. $12+i$
11. 20	12. 30
13. 50	14. $-65+72i$
15. $-\frac{1}{6}-\frac{2}{3}i$	16. $\frac{21}{10}-\frac{7}{10}i$
17. $-\frac{2}{5}+\frac{13}{10}i$	18. $\frac{9}{10}+\frac{1}{5}i$
19. $-\frac{7}{25}+\frac{24}{25}i$	20. $x=7$, $y=13$
21. $x=7$, $y=\frac{1}{3}$	22. $x=\frac{1}{9}$, $y=\frac{1}{5}$

1. $10\sqrt{-121}$
$= 10 \cdot 11i$
$= \boxed{110i}$

2. $\sqrt{-72}$
$i\sqrt{36 \cdot 2}$
$\boxed{6i\sqrt{2}}$

3. $3\sqrt{-450}$
$3i\sqrt{2 \cdot 3^2 \cdot 5^2}$
$\boxed{45i\sqrt{2}}$

4. $7\sqrt{-96}$
$7i\sqrt{2^5 \cdot 3}$
$\boxed{28i\sqrt{6}}$

5. $i^{13} = i \cdot (i^2)^6$
$= \boxed{i}$

6. $i^{48} = (i^2)^{24} = \boxed{1}$

7. $i^{23} = i \cdot (i^2)^{11} = \boxed{-i}$

8. $i^{54} = (i^2)^{27} = \boxed{-1}$

9. $2 - 8i + 6 + 5i$
$\boxed{8 - 3i}$

10. $3 + 3i + 9 - 2i$
$\boxed{12 + i}$

11. $(-4i) \cdot (5i)$
$= -20i^2 = -20(-1)$
$= \boxed{20}$

12. $(6 - 3i)(4 + 2i)$
$= 6(4 + 2i) - 3i(4 + 2i)$
$= 24 + 12i - 12i - 6i^2$
$= \boxed{30}$

13. $(5 - 5i)(5 + 5i)$
$= 25 - 25i^2$
$= \boxed{50}$

14. $(4 + 9i)^2$
$= 4(4 + 9i) + 9i(4 + 9i)$
$= 16 + 36i + 36i + 81i^2$
$= \boxed{-65 + 72i}$

15. $\frac{4 - i}{6i} \cdot \frac{i}{i} = \frac{4i - i^2}{6i^2}$
$= \frac{1 + 4i}{-6} = \boxed{-\frac{1}{6} - \frac{2}{3}i}$

16. $\frac{7}{3 + i} \cdot \frac{3 - i}{3 - i} = \frac{21 - 7i}{9 - i^2}$
$= \frac{21 - 7i}{10} = \boxed{\frac{21}{10} - \frac{7}{10}i}$

17. $\frac{-6+i}{2+4i} \cdot \frac{2-4i}{2-4i} = \frac{-6(2-4i)+i(2-4i)}{4-16i^2}$

$= \frac{-12+24i+2i-4i^2}{20} = \frac{-8+26i}{20} = \boxed{-\frac{2}{5} + \frac{13}{10}i}$

18. $\frac{3-5i}{2-6i} \cdot \frac{2+6i}{2+6i} = \frac{3(2+6i)-5i(2+6i)}{4-36i^2} = \frac{6+18i-10i-30i^2}{40}$

$= \frac{36+8i}{40} = \boxed{\frac{9}{10} + \frac{1}{5}i}$

19. $\frac{3+4i}{3-4i} \cdot \frac{3+4i}{3+4i} = \frac{3(3+4i)+4i(3+4i)}{9-16i^2} = \frac{9+12i+12i+16i^2}{25}$

$= \frac{-7+24i}{25} = \boxed{-\frac{7}{25} + \frac{24}{25}i}$

20. $5x+4yi = 35+52i$

$5x = 35$ $\quad$ $4yi = 52i$

$\boxed{x = 7}$ $\quad$ $\boxed{y = 13}$

21. $4+8xi = 12y+56i$

$4 = 12y$ $\quad$ $8xi = 56i$

$\boxed{y = \frac{1}{3}}$ $\quad$ $\boxed{x = 7}$

22. $3+9i = 27x+45yi$

$3 = 27x$ $\quad$ $9i = 45yi$

$\boxed{x = \frac{1}{9}}$ $\quad$ $\boxed{y = \frac{1}{5}}$