

# Answers: Arithmetic on complex numbers

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## Summary

Answers to questions relating to the guide on arithmetic on complex numbers.

*These are the answers to [Questions: Arithmetic on complex numbers](#).*

**Please attempt the questions before reading these answers!**

## Q1

- 1.1.  $(5 + 7i) - (2 + 3i) = 3 + 4i$
- 1.2.  $(8 + 6i) + (2 - 4i) = 10 + 2i$
- 1.3.  $(4 - i\sqrt{2}) - (3 + i\sqrt{7}) = 1 - (\sqrt{2} + \sqrt{7})i$
- 1.4.  $(\sqrt{8} + 4i) - (\sqrt{5} + 2i) = (2\sqrt{2} - \sqrt{5}) + 2i$
- 1.5.  $(\sqrt{7} + 3i) + (2 - i) = (\sqrt{7} + 2) + 2i$
- 1.6.  $(5 + i\sqrt{2}) - (7 - i) + (\sqrt{3} + 4i) = (\sqrt{3} - 2) + (\sqrt{2} + 5)i$

## Q2

- 2.1.  $(2 + 3i)(4 + 5i) = -7 + 22i$
- 2.2.  $(3 + i)(2 - i) = 7 - i$
- 2.3.  $4(6 + 3i) = 24 + 12i$
- 2.4.  $(1 + i)^2 = 0 + 2i = 2i$
- 2.5.  $(3 + 2i)^3 = -9 + 46i$
- 2.6.  $(7 - 4i)^2(i - 2) = -10 + 145i$
- 2.7.  $(1 - i\sqrt{3})^3 = -8 + 0i = -8$
- 2.8.  $(5 - 2i)(5 + 2i) = 29 + 0i = 29$
- 2.9.  $(\sqrt{2} + i\sqrt{3})(\sqrt{8} - i\sqrt{3}) = 7 + i\sqrt{6}$

### Q3

$$3.1. \quad \frac{7-6i}{1+2i} = -1-4i$$

$$3.2. \quad \frac{4-i}{1+4i} = 0-i = -i$$

$$3.3. \quad \frac{3}{5i} = 0 - \frac{3}{5}i = -\frac{3}{5}i$$

$$3.4. \quad \frac{4+2i}{3-i} = 1+i$$

$$3.5. \quad \frac{9+i}{i} = 1-9i$$

$$3.6. \quad \frac{-2-2i}{-2+2i} = 0+i = i$$

$$3.7. \quad \frac{1+5i}{-3i} = -\frac{5}{3} + \frac{1}{3}i$$

$$3.8. \quad \frac{-4}{1-i} = -2-2i$$

$$3.9. \quad \frac{1-3i}{1+2i} = -1-i$$

### Q4

$$4.1. \quad \frac{(6+4i)(3-i)}{2i} = 3-11i$$

$$4.2. \quad 3i(5-4i) + (6+2i) = 18+17i$$

$$4.3. \quad (2+3i)(1-i) - (5-4i) = 0+5i = 5i$$

$$4.4. \quad \frac{(5+2i) + (4-i)}{1+i} = 5-4i$$

$$4.5. \quad \frac{(2+i)^3}{(3+i) - (1+i)} = 1 + \frac{11}{2}i$$

$$4.6. \quad \left(\frac{6-3i}{2(1-i)}\right)^2 = \frac{9}{2} + \frac{27}{8}i$$

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### Version history and licensing

v1.0: initial version created 11/24 by Charlotte McCarthy as part of a University of St Andrews VIP project.

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