

## Second Year Assignment Test 5 version O

1. Use the binomial expansion to expand  $\left(1 - \frac{1}{2}x\right)^{\frac{1}{2}}$ ,  $|x| < 2$  in ascending powers of  $x$ , up to and including the term in  $x^3$ , simplifying each term.
2. An object is projected from a fixed origin O with velocity  $(4\mathbf{i} + 5\mathbf{j}) \text{ ms}^{-1}$ . The particle moves freely under gravity and passes through the point P with position vector  $k(\mathbf{i} - \mathbf{j}) \text{ m}$ , where  $k$  is a positive constant.
  - a) Find the value of  $k$  correct to 2 s.f.
  - b) Find:
    - i) the speed of the object at the instant when it passes through P correct to 2 s.f.
    - ii) the angle of motion of the object at the instant when it passes through P correct to 2 s.f.
3. The random variable  $X$  can take any value from 1 to 50. Given that  $X$  has a discrete uniform distribution, find:
  - a)  $P(X = 1)$
  - b)  $P(X \geq 28)$
  - c)  $P(13 < X < 42)$

## Second Year Assignment Test 5 version P

1. Use the binomial expansion to expand  $\left(1 + \frac{1}{2}x\right)^{\frac{1}{2}}$ ,  $|x| < 2$  in ascending powers of  $x$ , up to and including the term in  $x^3$ , simplifying each term.
2. An object is projected from a fixed origin O with velocity  $(3\mathbf{i} + 6\mathbf{j}) \text{ ms}^{-1}$ . The particle moves freely under gravity and passes through the point P with position vector  $k(\mathbf{i} - \mathbf{j}) \text{ m}$ , where  $k$  is a positive constant.
  - a) Find the value of  $k$  correct to 2 s.f.
  - b) Find:
    - i) the speed of the object at the instant when it passes through P correct to 2 s.f.
    - ii) the angle of motion of the object at the instant when it passes through P correct to 2 s.f.
3. The random variable  $X$  can take any value from 1 to 50. Given that  $X$  has a discrete uniform distribution, find:
  - a)  $P(X = 2)$
  - b)  $P(X \geq 29)$
  - c)  $P(10 < X < 40)$

## Second Year Assignment Test 5 version Q

1. Use the binomial expansion to expand  $\left(1 + \frac{1}{4}x\right)^{\frac{1}{2}}$ ,  $|x| < 2$  in ascending powers of  $x$ , up to and including the term in  $x^3$ , simplifying each term.
2. An object is projected from a fixed origin O with velocity  $(7\mathbf{i} + 7\mathbf{j}) \text{ ms}^{-1}$ . The particle moves freely under gravity and passes through the point P with position vector  $k(\mathbf{i} - \mathbf{j}) \text{ m}$ , where  $k$  is a positive constant.
  - a) Find the value of  $k$
  - b) Find:
    - i) the speed of the object at the instant when it passes through P correct to 2 s.f.
    - ii) the angle of motion of the object at the instant when it passes through P correct to 2 s.f..
3. The random variable  $X$  can take any value from 1 to 50. Given that  $X$  has a discrete uniform distribution, find:
  - a)  $P(X = 8)$
  - b)  $P(X \geq 38)$
  - c)  $P(1 < X < 42)$

## Second Year Assignment Test 5 version R

1. Use the binomial expansion to expand  $\left(1 - \frac{1}{4}x\right)^{\frac{1}{2}}$ ,  $|x| < 2$  in ascending powers of  $x$ , up to and including the term in  $x^3$ , simplifying each term.
2. An object is projected from a fixed origin O with velocity  $(4\mathbf{i} + 5\mathbf{j}) \text{ ms}^{-1}$ . The particle moves freely under gravity and passes through the point P with position vector  $k(\mathbf{i} - \mathbf{j}) \text{ m}$ , where  $k$  is a positive constant.
  - a) Find the value of  $k$  correct to 2 s.f.
  - b) Find:
    - i) the speed of the object at the instant when it passes through P correct to 2 s.f.
    - ii) the angle of motion of the object at the instant when it passes through P correct to 2 s.f.
3. The random variable  $X$  can take any value from 1 to 50. Given that  $X$  has a discrete uniform distribution, find:
  - a)  $P(X = 51)$
  - b)  $P(X \geq 49)$
  - c)  $P(13 < X < 14)$

## Answers Version O

$$1. 1 - \frac{x}{4} - \frac{x^2}{32} - \frac{x^3}{128}$$

$$2a) 7.3 \quad b) i) 14 \text{ ms}^{-1} \quad ii) 73^\circ$$

$$3a) 0.02 \quad b) 0.46 \quad c) 0.56$$

## Answers Version P

$$1. 1 + \frac{x}{4} - \frac{x^2}{32} + \frac{x^3}{128}$$

$$2a) 5.5 \quad b) i) 12 \text{ ms}^{-1} \quad ii) 76^\circ$$

$$3a) 0.02 \quad b) 0.44 \quad c) 0.58$$

## Answers Version Q

$$1. 1 + \frac{x}{8} - \frac{x^2}{128} + \frac{x^3}{1024}$$

$$2a) 20 \quad b) i) 22 \text{ ms}^{-1} \quad ii) 72^\circ$$

$$3a) 0.02 \quad b) 0.26 \quad c) 0.8$$

## Answers Version R

$$1. 1 - \frac{x}{8} - \frac{x^2}{128} - \frac{x^3}{1024}$$

$$2a) 7.3 \quad b) i) 14 \text{ ms}^{-1} \quad ii) 73^\circ$$

$$3a) 0 \quad b) 0.04 \quad c) 0$$