

NORMAL DISTRIBUTIONS

CANSU OLCE

A STAR MATHS (www.astarmaths.com.au)

1. Given that Z is a standard normal variable, find the values of the following.
 - a) $P(Z > 2.081)$
 - b) $P(0.8 < Z < 1.8)$
 - c) $P(-1.23 < Z < 0.25)$

2. A random variable X has a normal distribution with a mean of 25 and a standard deviation of 1.6. Find the z -score which corresponds to
 - a) $X=30$
 - b) $X=22$
 - c) $X=25$

3. A random variable X is normally distributed with a mean of 120 and a variance of 25. Find the values of X which correspond to the following z -scores.
 - a) $Z=1.2$
 - b) $Z=-2$
 - c) $Z=0$

4. A variable X has a normal distribution with a mean of 12 and a standard deviation of 2.5. Find the following probabilities.
 - a) $P(X < 10)$
 - b) $P(9 < X < 12)$
 - c) $P(8 < X < 11)$

5. The daily rainfall in a certain place has a normal distribution with a mean of 8 cm and a standard deviation of 2.5 cm. Find the probability that the rainfall on a certain day
 - a) exceeds 12 cm
 - b) is between 6 cm and 11 cm.

6. The resistance of a coil produced by a factory is normally distributed with a mean of 1200 ohm and a standard deviation of 100 ohm. Find the probability that the resistance of a coil produced by the factory is
 - a) more than 1280 ohm
 - b) less than 1328 ohm or more than 1480 ohm

7. A study reveals that the daily pocket money of students in a particular school has a normal distribution with a mean of \$5 and a standard deviation of \$2. Find the percentage of students in the school whose daily pocket money are
- less than \$3.50
 - more than \$6 but less than \$10
8. The intelligence quotients of 1500 university students are normally distributed with a mean of 100 and a variance of 400.
- If an intelligent quotient between 90 and 110 is considered ordinary, calculate the percentage of the university students who are in this category.
 - Calculate the number of university students whose intelligent quotients are more than 120.
9. The science marks of 2480 candidates have a normal distribution with a mean of 72 and a standard deviation of 12.
- Find the percentage of candidates who will score grade A in science if the minimum mark for grade A is 85.
 - Find the number of candidates who fail if the passing mark is 40.
10. A survey reveals that the masses of a random sample of n students have a normal distribution with a mean of 60 kg and a variance of 144 kg^2 .
- Find the probability that a student chosen at random weighs between 48 kg and 70 kg.
 - If 150 students weigh more than 64 kg, find the value of n .
11. Given that Z is a standard normal variable, find the value of h in each of the following.
- $P(Z > h) = 0.15$
 - $P(Z > h) = 0.8$
 - $P(Z < h) = 0.12$
 - $P(Z < h) = 0.76$
12. The masses of n students in a private institution are normally distributed with a mean of 58 kg and a variance of 225 kg^2 .
- If 300 students weigh less than 50 kg, find the value of n .
 - If 10% of the students weigh more than w kg, find the value of w .

13. The masses of grade A apples are normally distributed with a mean of 250 g and a standard deviation of 15 g. Find
- the probability that the mass of an apple picked at random weighs more than 240 g but less than 265 g.
 - the value of m is 16% of the apples weigh less than m g.
14. The marks obtained by candidates for the statistics paper have a normal distribution with a mean of μ and a standard deviation of σ . Given that 5% of the candidates scored more than 80 marks and 25% of the candidates scored less than 45 marks, find the values of μ and σ .
15. The masses of watermelons produced in an orchard are normally distributed with a mean μ kg and a variance of 0.01 kg^2 . If 975 out of 1000 watermelons produced in the orchard weigh more than 2.8 kg, find the value of μ .

ANSWERS

1. a) 0.0187 b) 0.176 c) 0.4894
2. a) 3.125 b) -1.875 c) 0
3. a) 126 b) 110 c) 120
4. a) 0.2119 b) 0.3849 c) 0.2898
5. a) 0.0548 b) 0.6730
6. a) 21.19 b) 0.9023
7. a) 22.66% b) 30.23%
8. a) 38.3% b) 238
9. a) 13.94% b) 9
10. a) 0.6388 b) $n=405$
11. a) 1.036 b) -0.8416 c) -1.175 d) 0.706
12. a) $n=1010$ b) $w=77.23$
13. a) 0.589 b) 235.1
14. $\mu = 55.17$ $\sigma = 15.09$
15. $\mu = 2.996$

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