



SOALAN RAMALAN MATEMATIK TAMBAHAN KERTAS 1

TABURAN KEBARANGKALIAN
PROBABILITY DISTRIBUTION

SIR VEN
(GURU ADIWIRA KEBANGSAAN 2019)

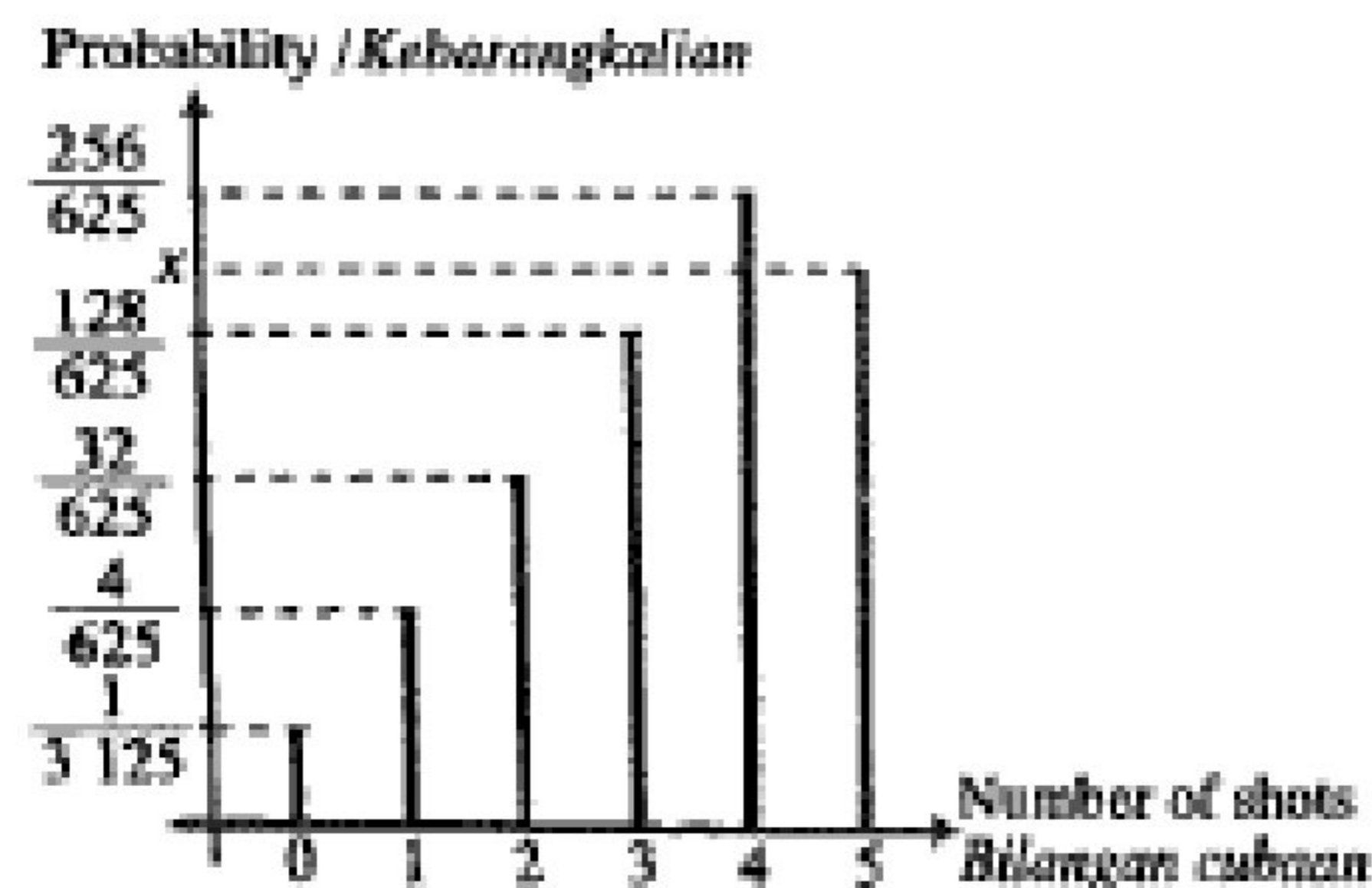
SPM 2023

TABURAN KEBARANGKALIAN
PROBABILITY DISTRIBUTION



Deva is one of an archer that represents his school in Archery Tournament amongst secondary schools. During practices, Deva has taken 5 shots in an archery practice. The probability that Deva strikes the target is p , where p is a constant. The coach then produces a sketch of the graph of probability distribution for the number of shots that strikes the target obtaining by Deva shown in Diagram 25.

Deva ialah salah seorang pemanah yang mewakili sekolahnya dalam Pertandingan Memanah di kalangan sekolah menengah. Semasa latihan, Deva membuat 5 kali percubaan dalam latihan memanah. Kebarangkalian bahawa Deva kena sasaran ialah p , di mana p ialah satu pemalar. Jurulatihnya kemudian menghasilkan satu lakaran graf bagi taburan kebarangkalian untuk bilangan kali Deva kena sasaran seperti yang ditunjukkan dalam Rajah 25.



- Find the values of p and of x .
Cari nilai bagi p dan x .
- Calculate the standard deviation of the number of shots that strikes the target obtaining by Deva.
Kira sisihan piawai bagi bilangan kali cubaan yang Deva kena sasaran.

[4 marks / markah]

Diagram 25 / Rajah 25



Diagram 10 shows the graph of binomial distribution of X .

Rajah 10 menunjukkan graf taburan binomial bagi X .

Find

Cari

- (a) the value of m ,
nilai m ,
- (b) $P(X \geq 2)$.

[3 marks/markah]

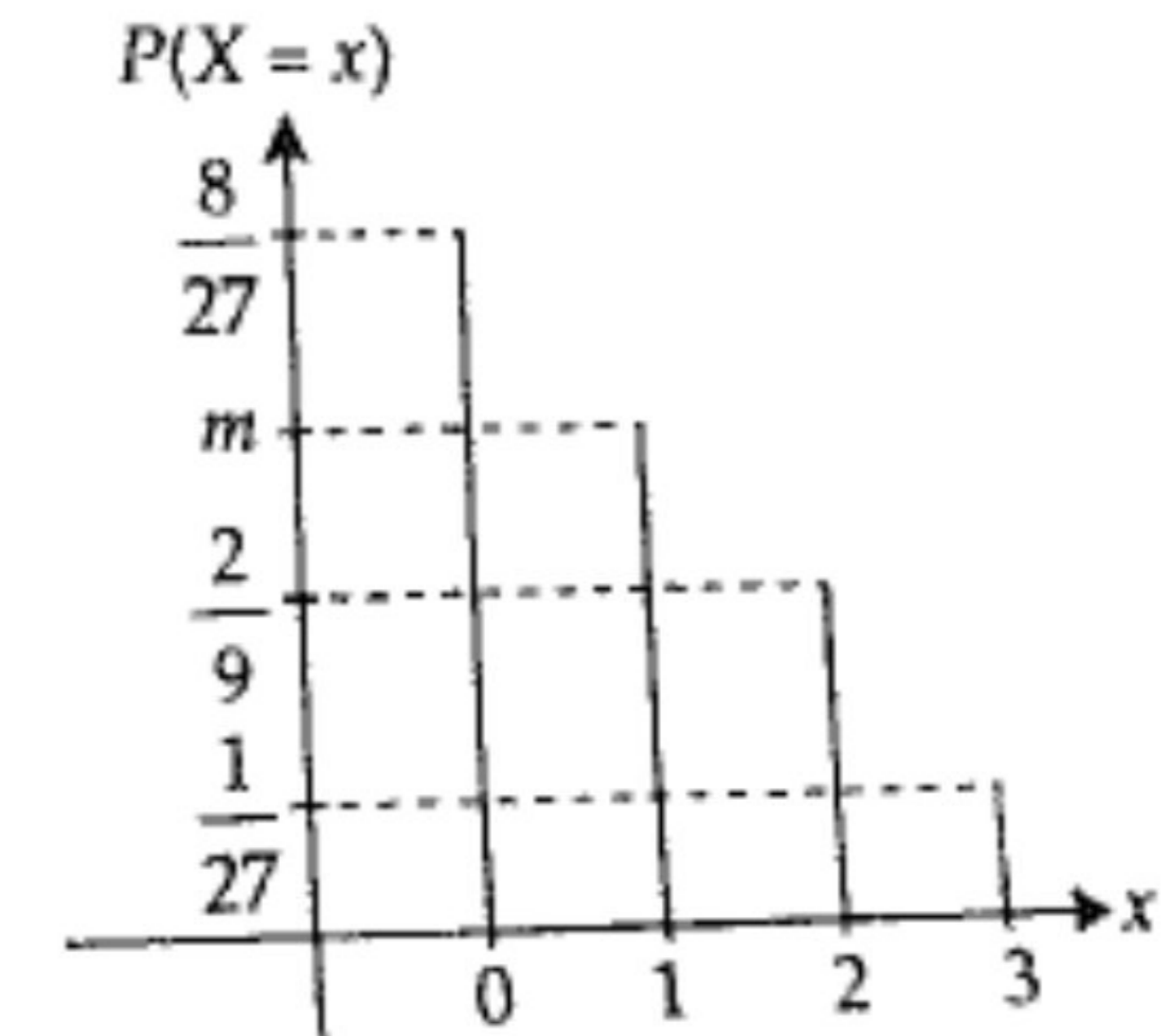


Diagram 10/Rajah 10

Answer/Jawapan:

(b)

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Given 80% of the candidates from a school have passed an examination. If 7 candidates are selected randomly from the school, calculate the probability that

Diberi 80% daripada calon di sebuah sekolah telah lulus dalam satu peperiksaan. Jika 7 orang calon dipilih secara rawak, hitung kebarangkalian bahawa

(a) exactly 5 candidates passed.
tepat 5 orang calon lulus.

(b) at least 2 candidates passed.
sekurang-kurangnya 2 orang calon lulus.



Diagram 9 shows the graph of binomial distribution $X \sim B(n, p)$.
Rajah 9 menunjukkan graf taburan binomial $X \sim B(n, p)$.

- (a) Express $P(X < 3)$ in terms of a and b .
Ungkapkan $P(X < 3)$ dalam sebutan a dan b .
- (b) Find the values of n and p .
Cari nilai-nilai n dan p .

[3 marks/markah]

Answer/Jawapan:

(a)

(b)

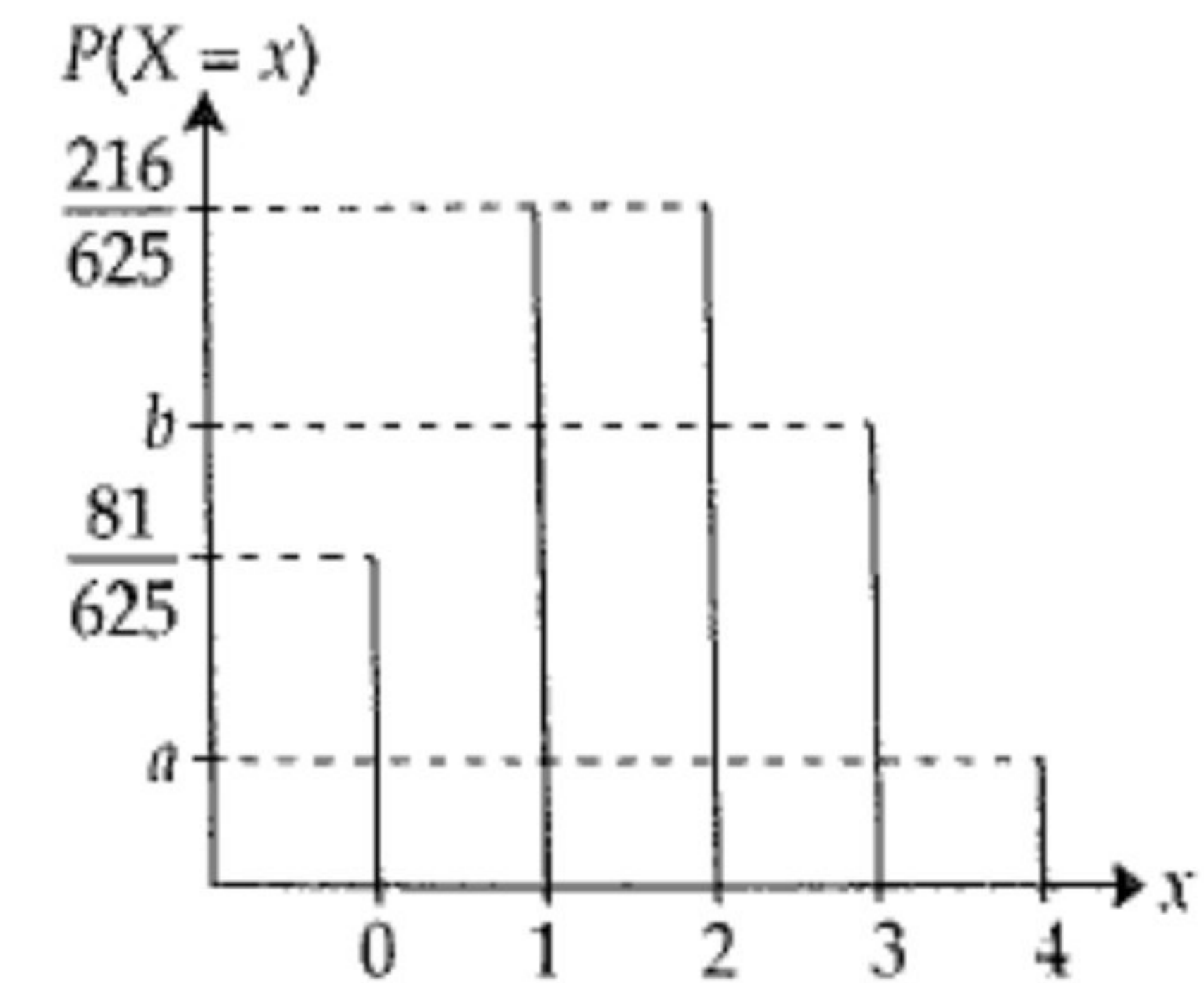


Diagram 9/Rajah 9

TABURAN KEBARANGKALIAN
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a) X ialah satu pemboleh ubah rawak diskrit yang mewakili isi rumah yang memiliki telefon bimbit di sebuah kawasan perumahan. Kesudahan ujikaji dan kebarangkalian isi rumah yang mempunyai telefon bimbit adalah seperti Jadual 4.
 X is a discrete random variable that represents a household that owns a cell phone in a residential area. The results of the experiment and the probability of households having a mobile phone are as shown in Table 4.

(i) Lengkapkan Jadual 4.
Complete Table 4.

Jawapan/ Answer:

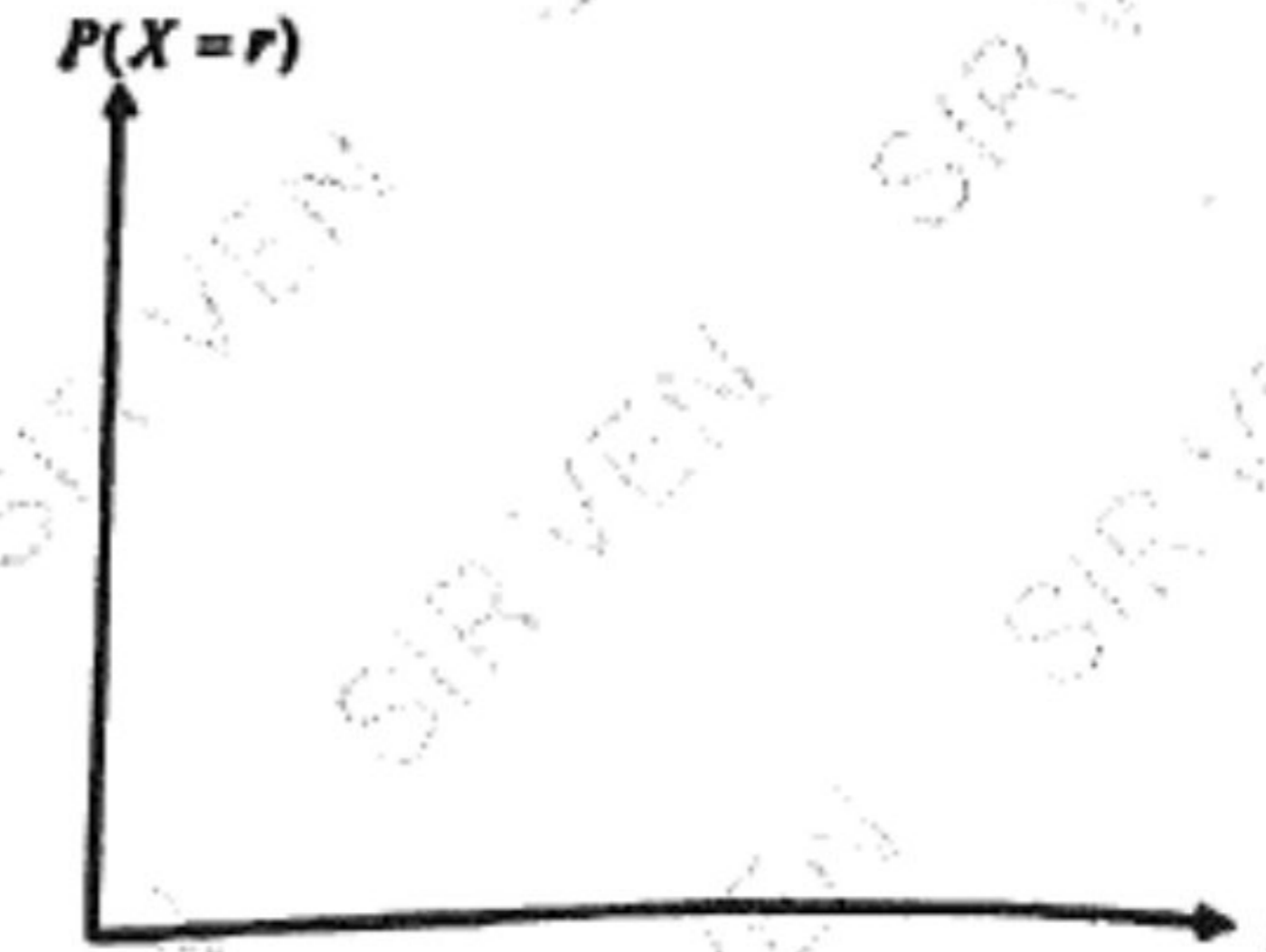
$X = r$	0	1	2	3	4
Kebarangkalian Probability	$\frac{1}{16}$	$\frac{1}{4}$		$\frac{1}{4}$	$\frac{1}{16}$

Jadual 4
Table 4

[1 markah / 1 mark]

(ii) Seterusnya, dengan menggunakan Jadual 4 lakar satu graf taburan kebarangkalian bagi X .
Hence, by using Table 4 sketch a probability distribution graph for X .

Jawapan/ Answer:

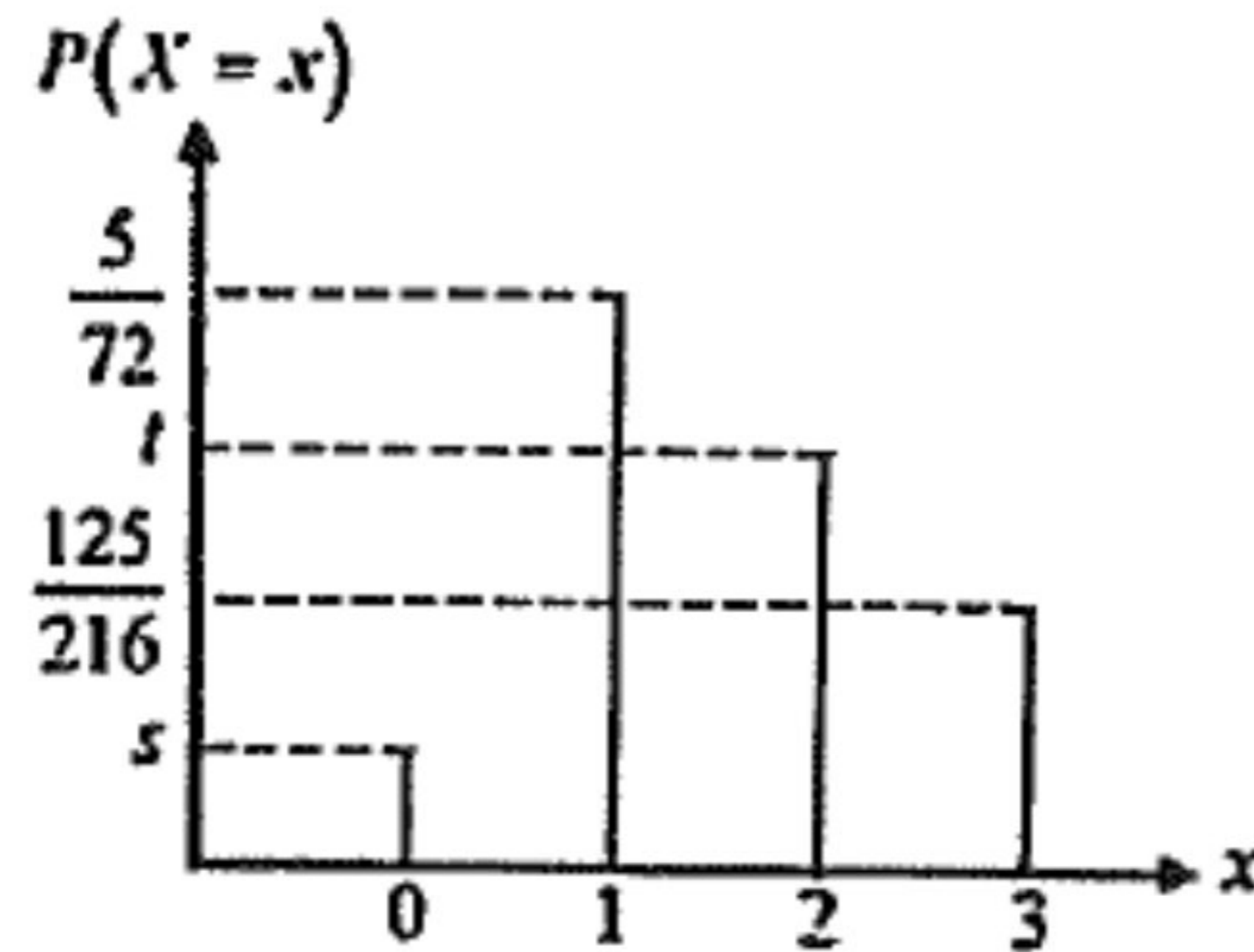


Diberi $X \sim N(80, 225)$, cari nilai $P(X < 85)$.
Given $X \sim N(80, 225)$, find the value of $P(X < 85)$.



(b) Rajah 8 menunjukkan graf bagi taburan binomial $X \sim B(3, p)$.

Diagram 8 shows the graph of binomial distribution $X \sim B(3, p)$.



Rajah 8 / Diagram 8

(i) Ungkapkan $P(X \leq 2)$ dalam sebutan s dan t.

Express $P(X \leq 2)$ in terms of s dan t.

(ii) Cari nilai p.

Find the value of p.



Rajah 8 menunjukkan graf $X \sim B(n, 0.4)$ yang tidak lengkap.

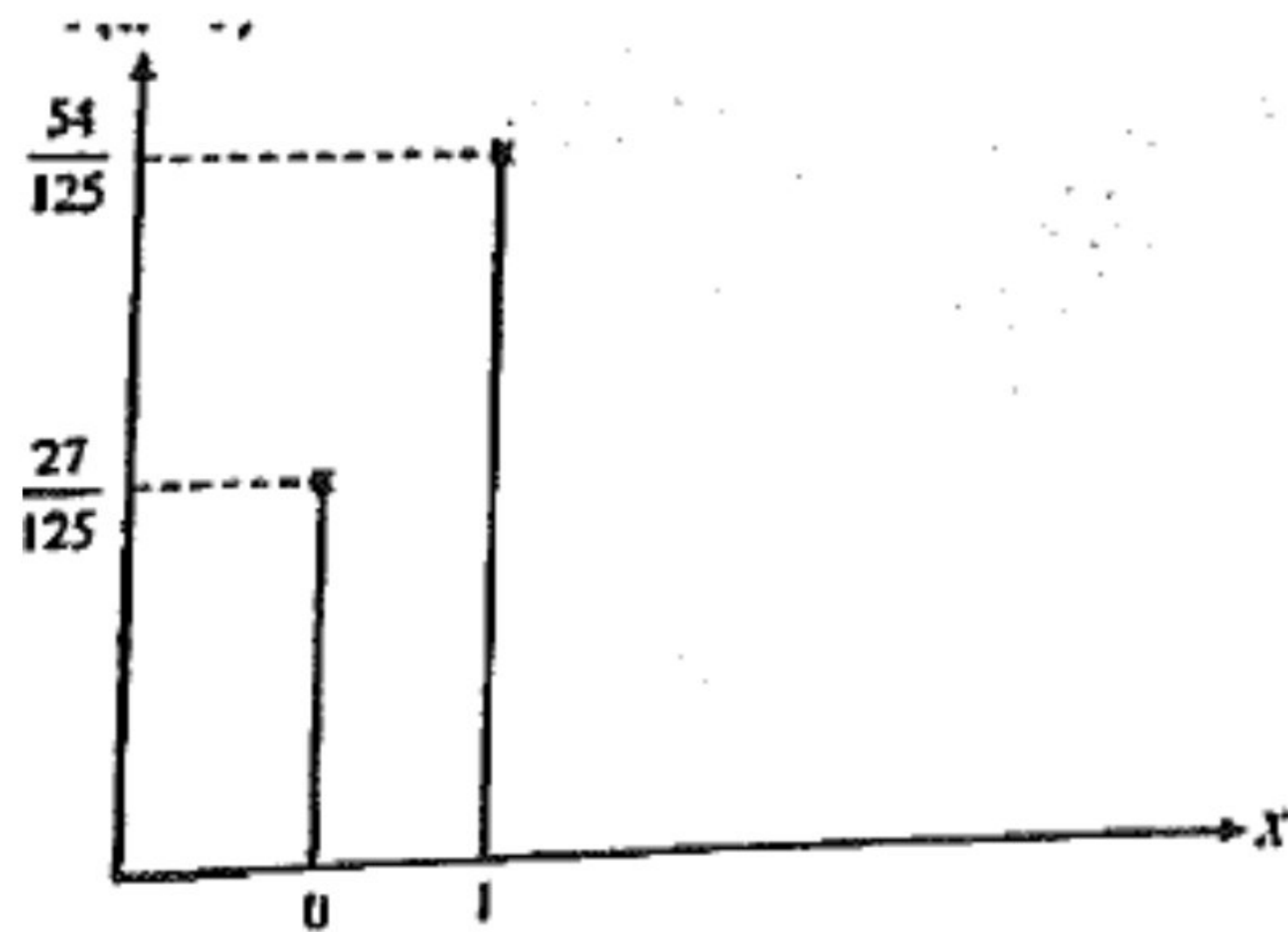
Diagram 8 shows an incomplete graph of $X \sim B(n, 0.4)$.

(a) Cari nilai n . [2 markah]

Find the value of n . [2 marks]

(b) Seterusnya, pada Rajah 8, lengkapkan graf tersebut. [2 markah]

Hence, on Diagram 8, complete the graph. [2 marks]



Rajah 8



The heights of the staffs in a company have a normal distribution with a mean of 167 cm and a standard deviation of σ cm.

Tinggi pekerja-pekerja di sebuah syarikat mempunyai taburan normal dengan min 167 cm dan sisihan piawai σ cm.

(a) Find the value of σ if the z -score of a staff with a height of 169.8 cm is 0.35.

Cari nilai σ jika skor- z seorang pekerja dengan tinggi 169.8 cm ialah 0.35.

(b) When a staff is chosen at random from the company, find the probability that the staff has a height of between 165.4 cm and 169.8 cm.

Apabila seorang pekerja dipilih secara rawak daripada syarikat itu, cari kebarangkalian bahawa pekerja itu mempunyai tinggi antara 165.4 cm hingga 169.8 cm.

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Diagram 11 shows a standard normal distribution graph.
Rajah 11 menunjukkan satu graf taburan normal piawai.

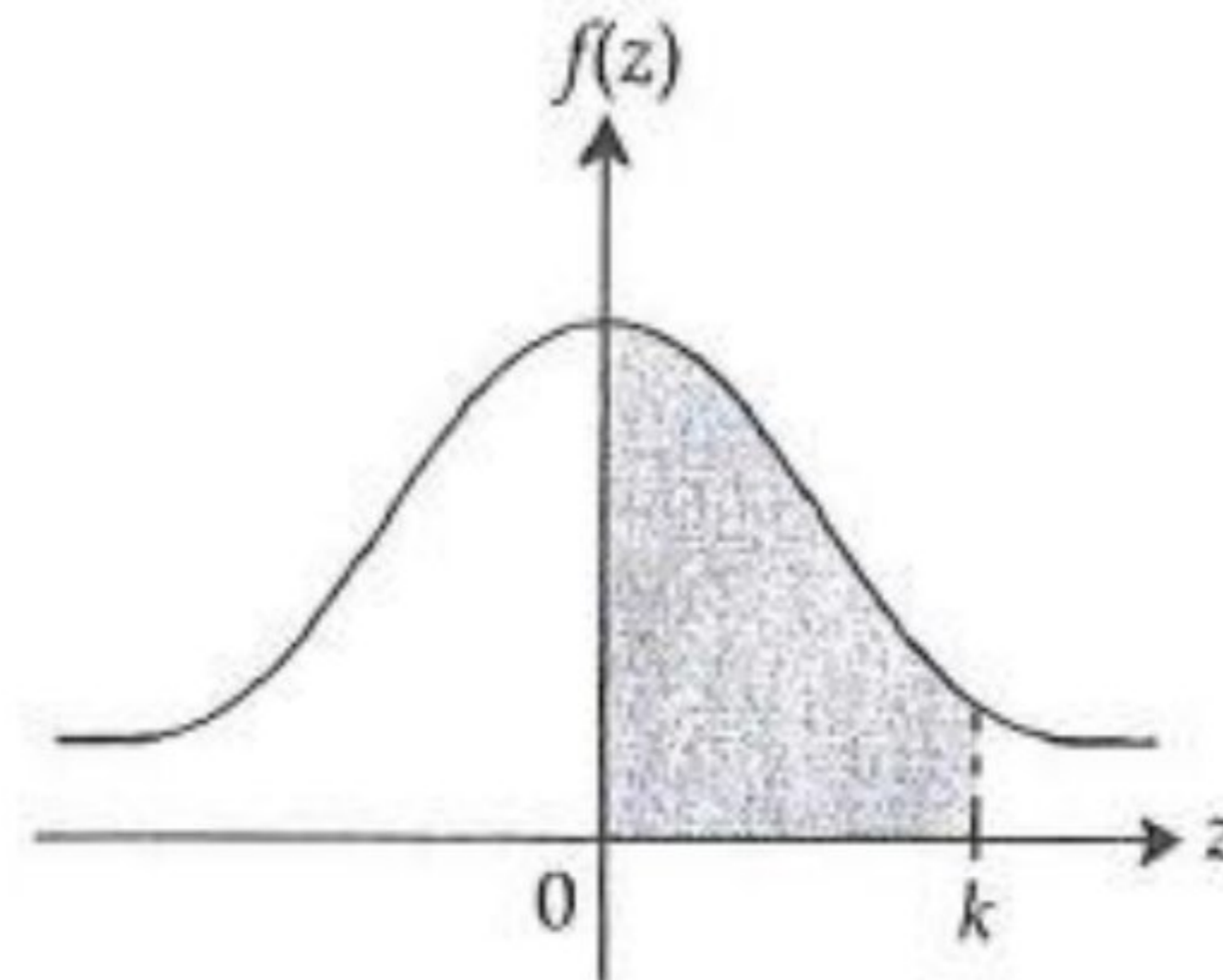


Diagram 11/Rajah 11

Given the probability represented by the area of the shaded region is 0.2257.

Diberi kebarangkalian yang diwakili oleh luas kawasan berlorek ialah 0.2257.

(a) Find the value of k .

Cari nilai k .

(b) X is a continuous random variable of a normal distribution with a mean of 175 and a variance of 36. Find the value of X when the z -score of X is k .

X ialah pemboleh ubah rawak selanjar bagi taburan normal dengan min 175 dan varians 36. Cari nilai X apabila skor- z bagi X ialah k .

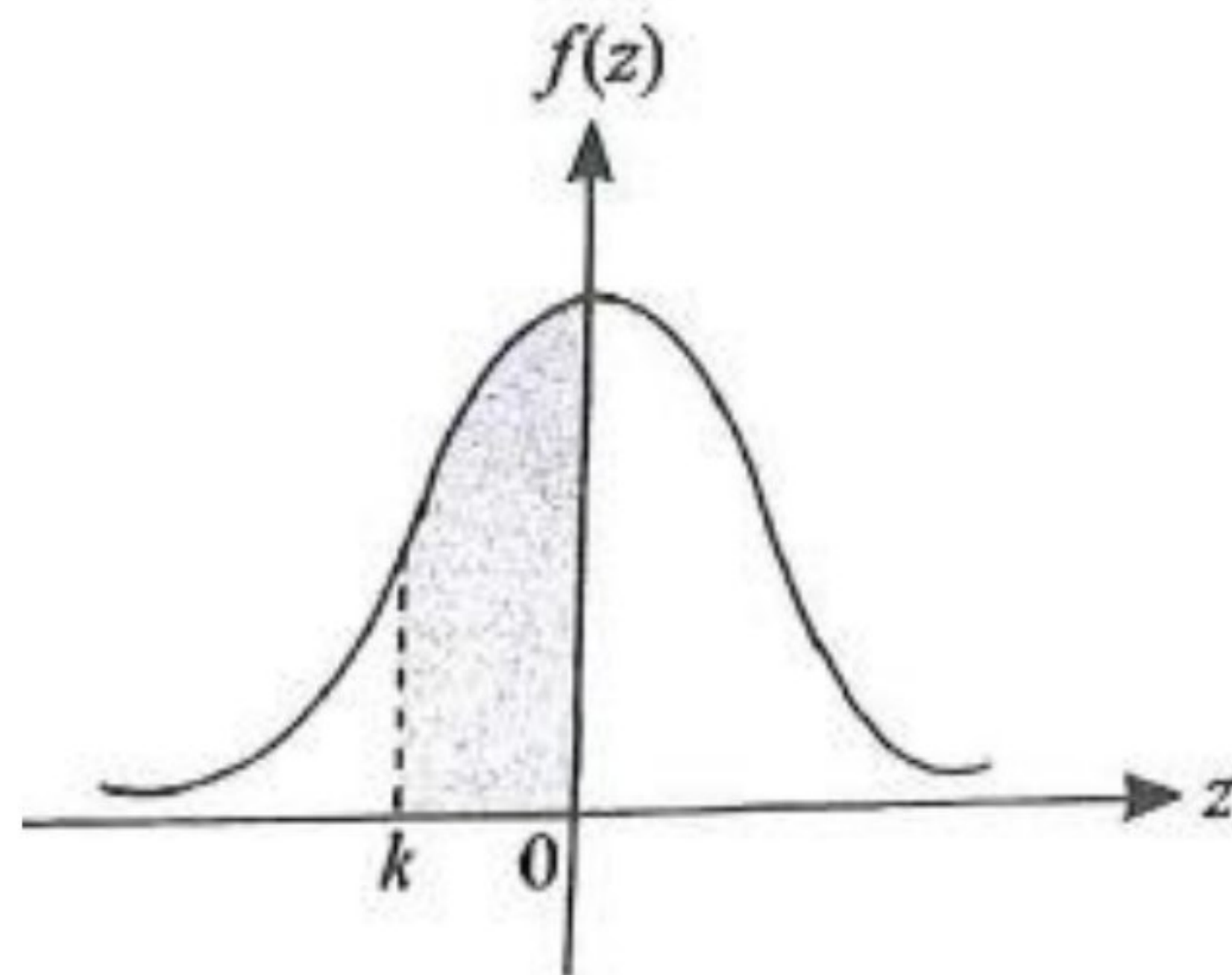


Diagram 15 / Rajah 15

Diagram 15 shows a standard normal distribution graph. The probability represented by the area of the shaded region is 0.3121.

Rajah 15 menunjukkan satu graf taburan normal piawai. Kebarangkalian yang diwakili oleh luas kawasan berlorek ialah 0.3121.

- (a) Find the value of k . / Cari nilai bagi k .
- (b) X is a continuous random variable which is normally distributed with a mean, μ and a variance of 25. Find the value of μ if the z -score of $X = 52.65$ is k .

X ialah pemboleh ubah rawak selanjar bertaburan secara normal dengan min, μ dan varians 25. Cari nilai bagi μ jika skor- z bagi $X = 52.65$ ialah k . [4 marks / markah]

TABURAN KEBARANGKALIAN
PROBABILITY DISTRIBUTION

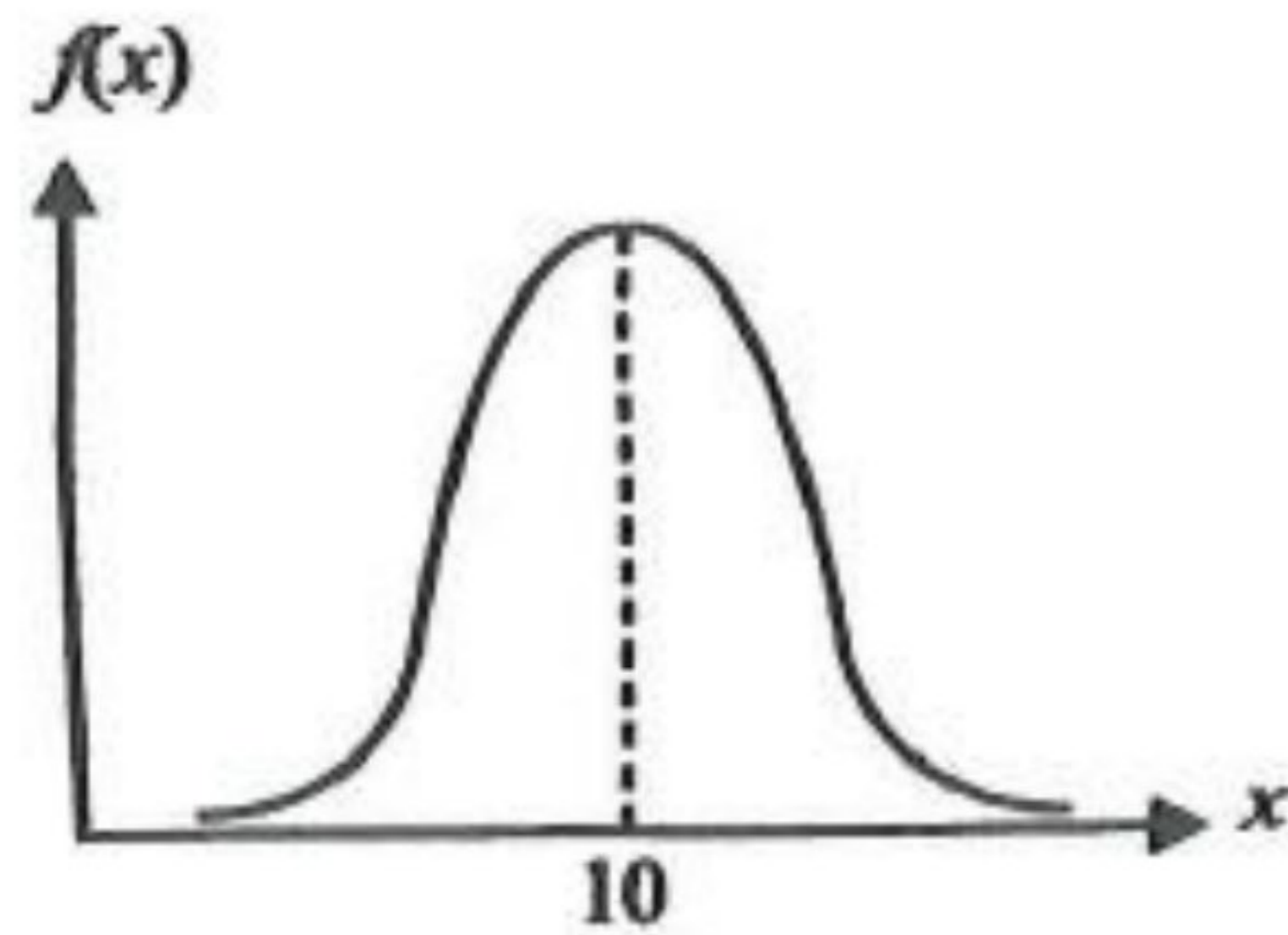


Diagram 25 / Rajah 25

Diagram 25 shows a normal distribution graph of a random variables $X \sim N(\mu, 4)$. / Rajah 25 menunjukkan graf taburan normal bagi pemboleh ubah rawak $X \sim N(\mu, 4)$.

- (a) State / Nyatakan
- the value of μ , / nilai μ ,
 - standard deviation. / sisihan piawai.
- (b) By using the above variance and standard deviation of the normal distribution, find the value of $P(X \geq 13)$. / Dengan menggunakan varians dan sisihan piawai bagi taburan normal di atas, cari nilai bagi $P(X \geq 13)$.

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TABURAN KEBARANGKALIAN
PROBABILITY DISTRIBUTION

5

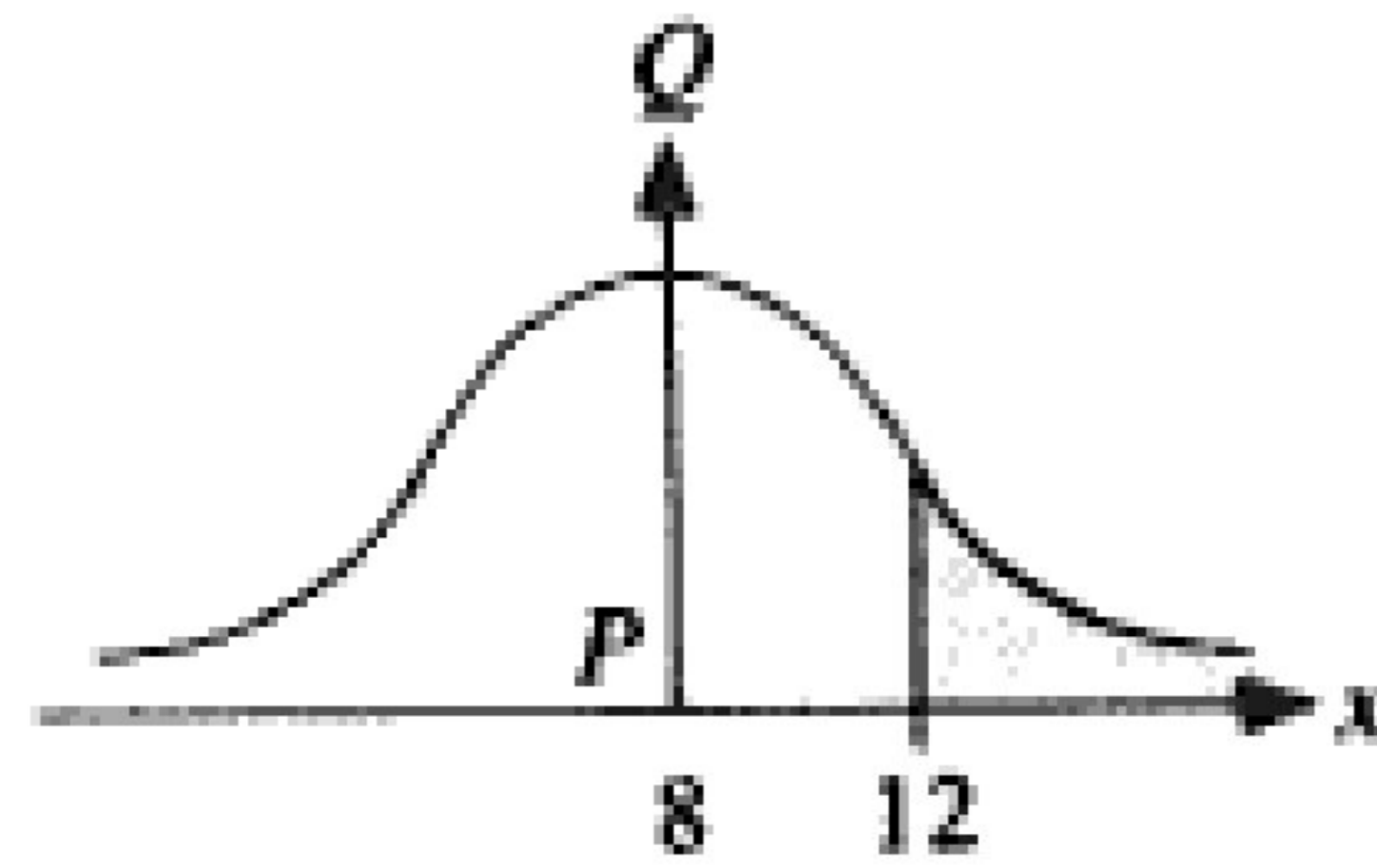


Diagram 25 / Rajah 25

Diagram 25 shows a probability distribution graph for a random variable X , $X \sim N(\mu, \sigma^2)$. It is given that PQ is the axis of symmetry of the graph.

Rajah 25 menunjukkan graf taburan kebarangkalian bagi suatu pemboleh ubah rawak X , $X \sim N(\mu, \sigma^2)$. Diberi bahawa PQ adalah paksi simetri bagi graf itu.

- (a) State the value of μ . / Nyatakan nilai μ .
- (b) If the area of the shaded region is 0.28, state the value of $P(4 \leq X \leq 12)$.
Jika luas kawasan berlorek ialah 0.28, nyatakan nilai bagi $P(4 \leq X \leq 12)$.
[4 marks / markah]

TABURAN KEBARANGKALIAN
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Diagram 10 shows a graph of standard normal distribution.
Rajah 10 menunjukkan satu graf taburan normal piawai.

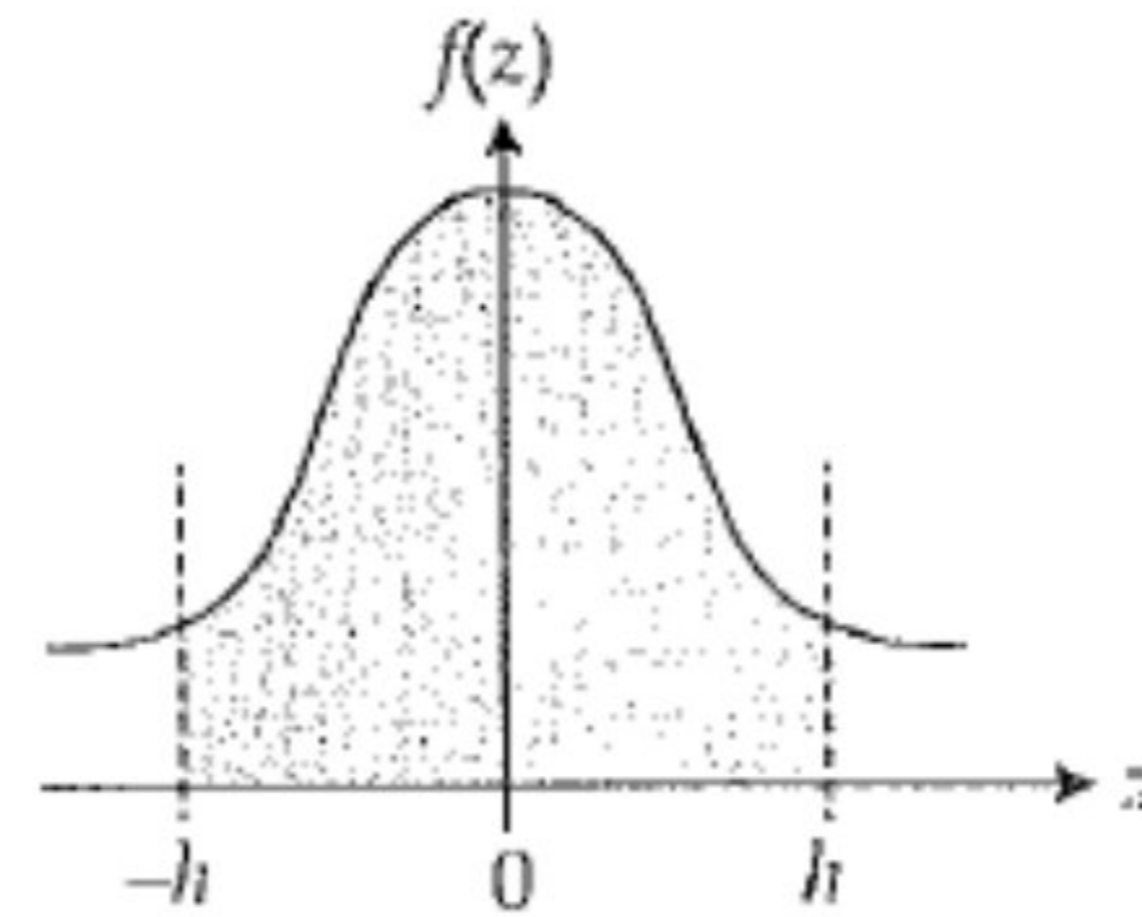


Diagram 10/Rajah 10

It is given that the probability represented by $P(Z > h)$ is 0.1202.
Diberi bahawa kebarangkalian yang diwakili oleh $P(Z > h)$ ialah 0.1202.

Calculate

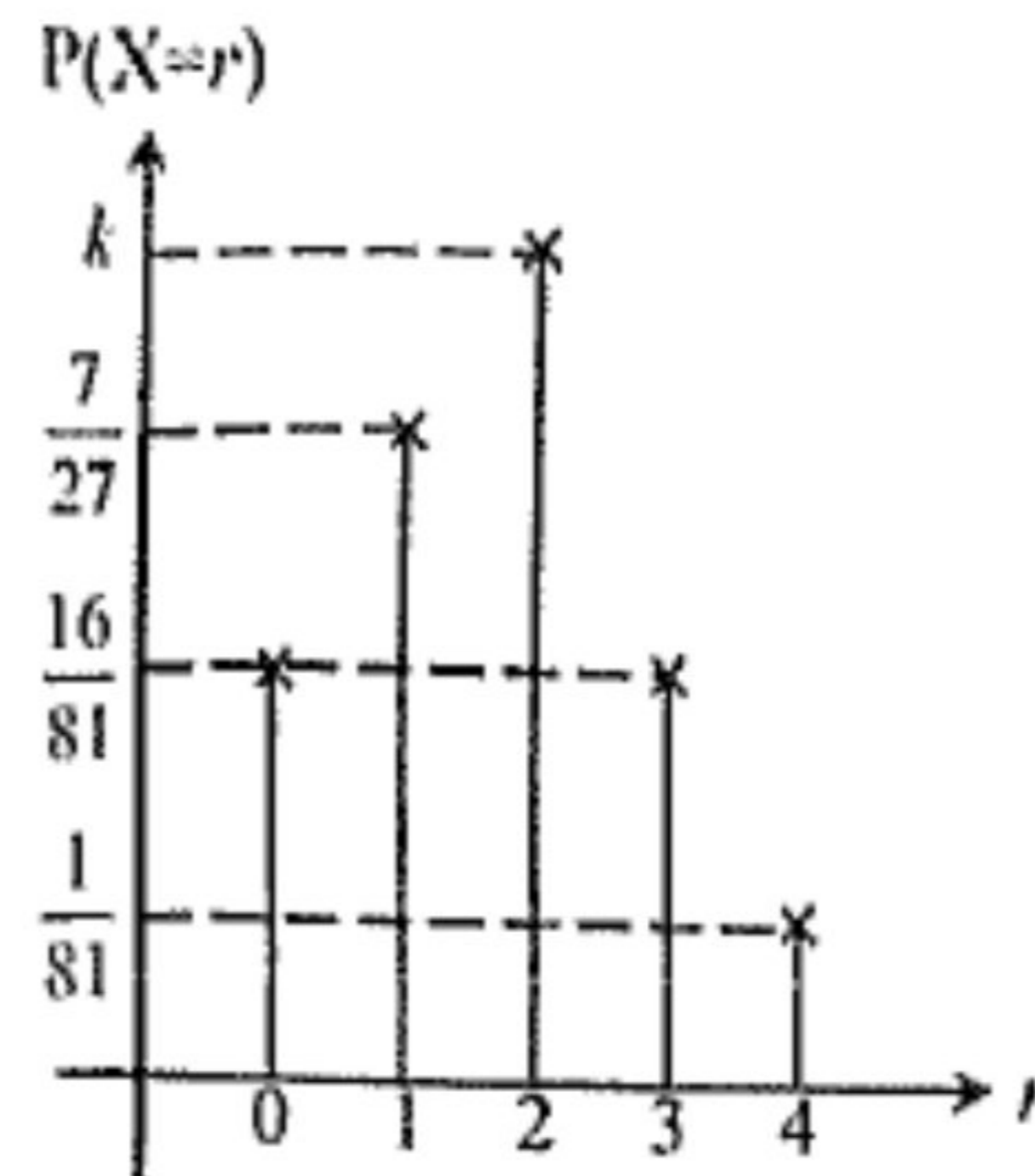
Hitung

- the area of the shaded region,
luas bagi rantau berlorek,
- the value of h .
nilai bagi h .

TABURAN KEBARANGKALIAN
PROBABILITY DISTRIBUTION



- (a) Rajah 7 menunjukkan graf bagi taburan binomial $X \sim B(4, p)$.
Diagram 7 shows the graph of binomial distribution $X \sim B(4, p)$.



Rajah 7/ Diagram 7

Cari nilai bagi k dan p .
Find the value of k and of p .

- b) Diberi X ialah pembolehubah rawak selangar di mana $X \sim N(12.45, 25)$. Cari
Given X is a continuous random variable where $X \sim N(12.45, 25)$. Find
- nilai X jika skor- z ialah 1.11,
the value of X if the z -score is 1.11,
 - nilai k apabila $P(-k < z < k) = 0.7154$.
the value of k when $P(-k < z < k) = 0.7154$.

TABURAN KEBARANGKALIAN
PROBABILITY DISTRIBUTION



- (a) 25% daripada murid-murid Tingkatan Lima sebuah sekolah mendapat keputusan 'A+' dalam Matematik Tambahan SPM. Jika 6 orang murid yang mengambil SPM dipilih secara rawak, hitung kebarangkalian bahawa
- 25% of the Form 5 students in a school got 'A+' for the result of Additional Mathematics SPM. If 6 students that took SPM are randomly selected, find the probability that*
- (i) tepat separuh daripada bilangan murid-murid itu mendapat 'A+' dalam Matematik Tambahan. [2 markah]
exactly half the number of students got 'A+' in Additional Mathematics. [2 marks]
- (ii) sekurang-kurangnya seorang murid mendapat keputusan 'A+' dalam Matematik Tambahan. [2 markah]
at least one student got 'A+' for the result of Additional Mathematics. [2 marks]
- (b) Satu kajian jisim badan dijalankan ke atas sekumpulan murid dan di dapati jisim murid adalah mengikut taburan normal dengan min 43 kg dan varians 64 kg^2 . Diberi $P(|x| \leq k) = 0.6184$, cari nilai k . [3 markah]
A body mass study was conducted to a group of students and it is found that the students body mass is normally distributed with mean 43 kg and variance 64 kg^2 . Given that $P(|x| \leq k) = 0.6184$, find the value of k . [3 marks]

TABURAN KEBARANGKALIAN
PROBABILITY DISTRIBUTION



(a) $P(X=0) = {}^5C_0 p^0 q^5 = \frac{1}{3125}$

$$q^5 = \left(\frac{1}{5}\right)^5$$

$$q = \frac{1}{5}, p = \frac{4}{5}$$

$$P(X=5) = 1 - \frac{1}{3125} - \frac{4}{625} - \frac{32}{625}$$

$$- \frac{128}{625} - \frac{256}{625}$$

$$= \frac{1024}{3125}$$

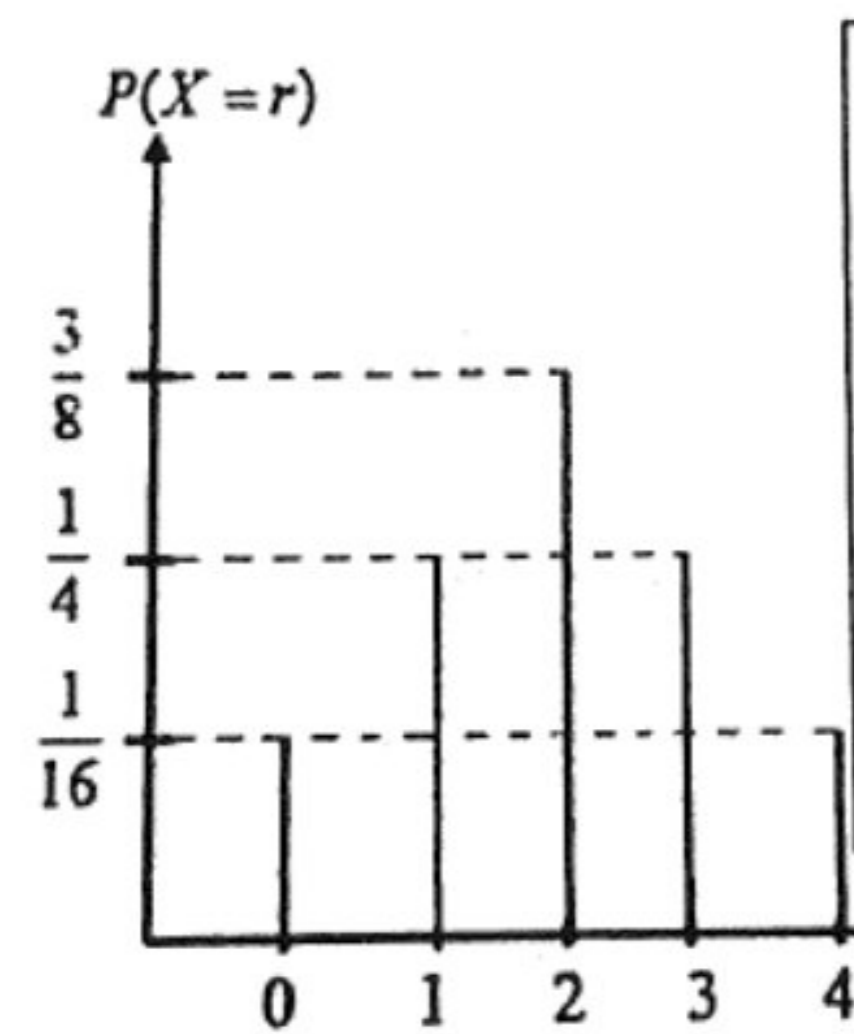
(b) $\sigma = \sqrt{npq}$

$$= \sqrt{5 \left(\frac{4}{5}\right) \left(\frac{1}{5}\right)} = 0.8944$$

(a) $1 - b - a$

(b) $n = 4, p = \frac{2}{5}$

$X = r$	0	1	2	3	4
Kebarangkalian Probability	$\frac{1}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{16}$



b)

$$z < \frac{85-80}{15}$$

$$1 - 0.3696$$

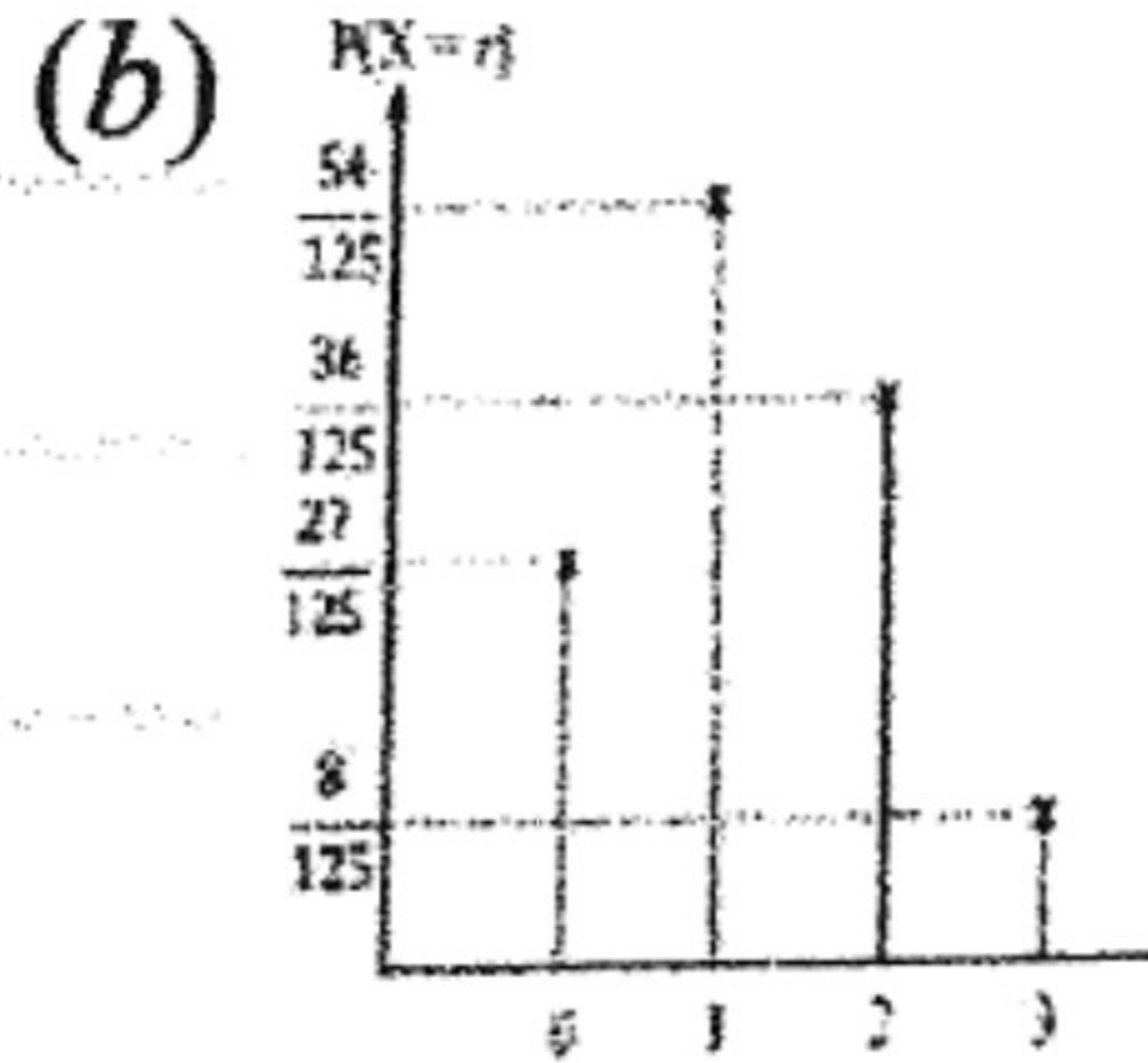
$$0.6304$$

[Ans: (i) $s + \frac{5}{72} + t$; (ii) $\frac{5}{6}$]

TABURAN KEBARANGKALIAN
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[Ans : (a) $n = 5$]



(a) $Z = \frac{X - \mu}{\sigma}$

$$0.35 = \frac{169.8 - 167}{\sigma}$$

$$\sigma = \frac{169.8 - 167}{0.35}$$

$$= 8$$

(b) $P(165.4 < X < 169.8)$

$$= P\left(\frac{165.4 - 167}{8} < Z < \frac{169.8 - 167}{8}\right)$$

$$= P(-0.2 < Z < 0.35)$$

$$= 1 - P(Z > 0.2) - P(Z > 0.35)$$

$$= 1 - 0.4207 - 0.3632$$

$$= 0.2161$$

(a) $k = 0.6$

(b) $x = 178.6$

(a) $P(z < k) = 0.1879$

$$k = -0.885$$

(b) $\frac{52.65 - \mu}{5} = -0.885$

$$\mu = 57.075$$



(a) (i) $\mu = 10$

(ii) $\sigma = \sqrt{4} = 2$

(b) $P(X \geq 13) = P\left(z \geq \frac{13 - 10}{2}\right)$
 $= P(z \geq 1.5)$
 $= 0.0668$

(a) $\mu = 8$

(b) $0.5 - 0.28 = 0.22$
 $0.22 \times 2 = 0.44$

(a) 0.7596

(b) 1.174

$$P(x = 3) = {}^6C_3 (0.25)^3 (0.75)^3 = 0.1318$$

$$1 - P(x = 0)$$

$$1 - {}^6C_0 (0.25)^0 (0.75)^6$$

$$0.8220$$

$$P(-k \leq z \leq k) = 0.6184$$

$$\frac{1 - 0.6184}{2} = 0.1908$$

$$\frac{k - 43}{8} = 0.875$$

$$k = 50$$