

Kumpulan Rumus Matematika Kelas IX

* Bilangan Berpangkat (x^n)

Dasar Bilangan Berpangkat = ① $2^2 \times 2^3 = 2^{2+3} = 2^5$

② $2^3 \div 2^2 = 2^1 = 2$

③ $(2^2)^3 = 2^{2 \times 3} = 2^6$

④ $\sqrt{2^4} = 2^{4/2} = 2^2 = 4$

⑤ $2^0 = 1, a^0 = 1$

Contoh Soal =

1) $\sqrt{32} + \sqrt{8} - \sqrt{50} = \sqrt{16 \times 2} + \sqrt{4 \times 2} - \sqrt{25 \times 2}$

$$4\sqrt{2} + 2\sqrt{2} - 5\sqrt{2}$$

$$1\sqrt{2} = \sqrt{2}$$

2) $\frac{a^2 \cdot b^3 \cdot c^{-4}}{a \cdot b^2 \cdot c^2} = a^{2-1} \cdot b^{3-2} \cdot c^{-4-2} = a \cdot b \cdot c^{-6} = \frac{ab}{c^6}$

* Barisan dan deret

① Aritmatika (\oplus, \ominus)

Contoh = 2, 4, 6, 8, ... Tes Aritmatika: $u_2 - u_1 = u_3 - u_2$

$$4 - 2 = 6 - 4$$

$$2 = 2 \text{ (ARIT)}$$

* Barisan (U_n)

$$U_n = a + (n-1) \cdot b$$

a = suku awal, b = beda/selisih, U_n = suku ke- n

Contoh = Tentukan suku ke-10 dari barisan berikut

$$2, 4, 6, 8, \dots$$

Jawab = $U_n = a + (n-1) \cdot b \Rightarrow U_{10} = 2 + (10-1) \cdot 2$

$$= 2 + 9 \cdot 2 = 2 + 18 = 20$$

* Deret (S_n)

$$S_n(\text{Deret}) = \frac{1}{2} (2a + (n-1) \times b) \text{ atau } S_n = \frac{1}{2} (a + U_n)$$

Contoh: Jumlah 10 suku Pertama dari barisan

2, 4, 6, 8, ...

$$\begin{aligned} \text{Jawab: } S_{10} &= \frac{1}{2} (2 \cdot 2 + (10-1) \times 2) = 5(4 + 9 \times 2) = 5(4 + 18) \\ &= 5 \times 22 = 110 \end{aligned}$$

② Geometri (\otimes , \odiv)

2, 4, 8, 16, ... Test: $U_2/U_1 = U_3/U_2$

$$4/2 = 8/4$$

$$2 = 2$$

* Barisan (U_n)

$$U_n = a \cdot r^{n-1}, r = \text{rasio} = U_2/U_1$$

Contoh Soal: Barisan ke 8 dari deret berikut adalah ...

2, 4, 8, 16, ...

$$\text{Jawab: } U_8 = 2 \times 2^{8-1} = 2 \times 2^7 = 2^8 = 2^4 \times 2^4 = 16 \times 16 = 256$$

* Deret (S_n)

$$S_n = \frac{a(r^n - 1)}{r - 1} \Rightarrow r > 1, \text{ misalnya: } 2, 3$$

$$S_n = \frac{a(1 - r^n)}{1 - r} \Rightarrow r < 1, \text{ misalnya: } 1/2, 1/3$$

Contoh: Jumlah 5 suku pertama dari barisan: 2, 4, 8, ...

Jawab: $r > 1, r = 2$

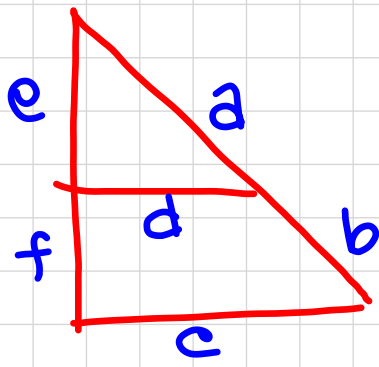
$$\text{maka } S_5 = \frac{2 \cdot (2^5 - 1)}{2 - 1} = 2 \cdot (32 - 1) = 2 \times 31 = 62$$

③ Tak Tentu

$$2, 4, 7, 11, \dots \quad U_n = a + (n-1) \cdot b + \frac{(n-1)(n-2)c}{2}$$

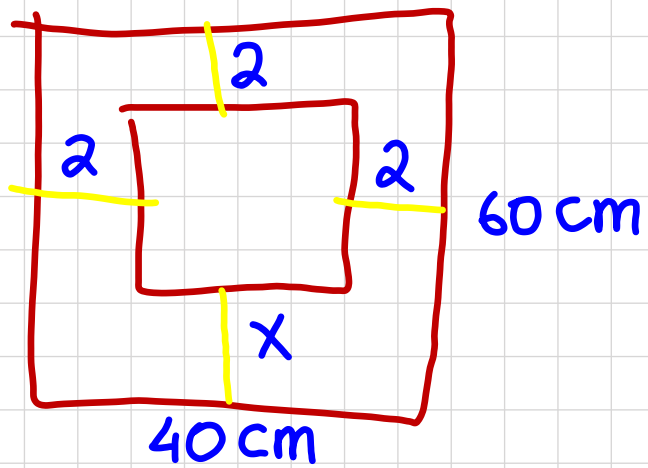
$$\begin{aligned} \text{Suku ke-6} = U_6 &= 2 + (6-1) \cdot 2 + \frac{(6-1) \cdot (6-2) \cdot 1}{2} = 2 + 5 \cdot 2 + \frac{5^2 \cdot 1}{2} \\ &= 2 + 10 + 10 = 22 \end{aligned}$$

* Kesebangunan



$$e/f = a/b$$

$$d/c = a/a+b$$



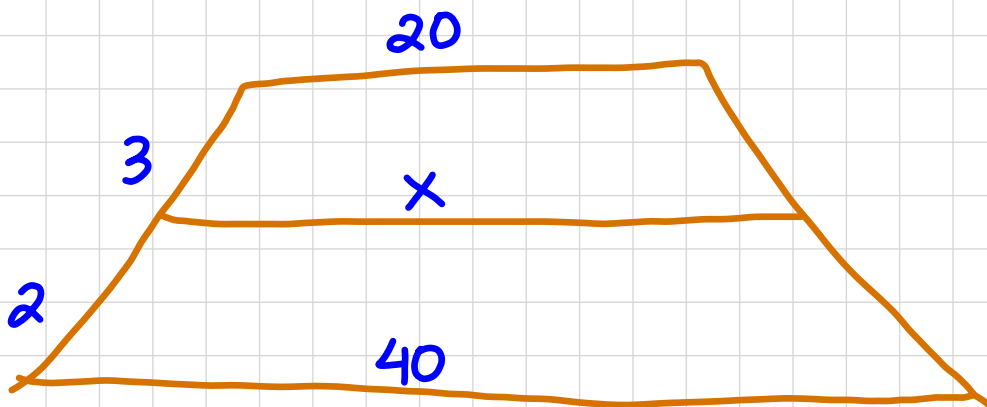
Cara I $\Rightarrow \frac{p_f}{l_f} = \frac{p_p}{l_p}$

Cara II $\Rightarrow (2+2) \cdot \cancel{60}_3 = (2+x) \cdot \cancel{40}_2$

$$\cancel{24} \cdot 3 = (2+x) \cdot \cancel{2}_1$$

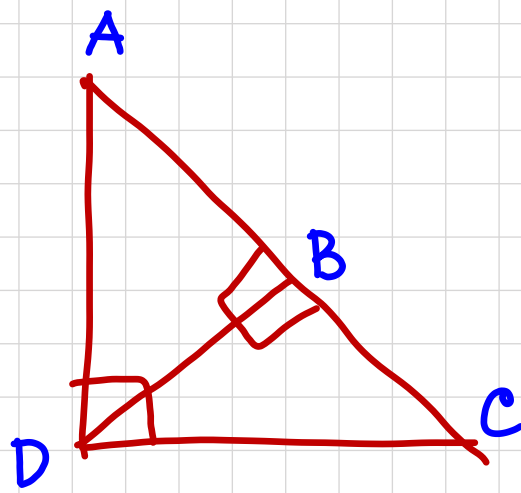
$$6 = 2+x$$

$$x = 4$$



$$x = (3 \cdot 40 + 2 \cdot 20) / 5 = (120 + 40) / 5 = 160 / 5 = 32$$

AIR MANCUR \Rightarrow



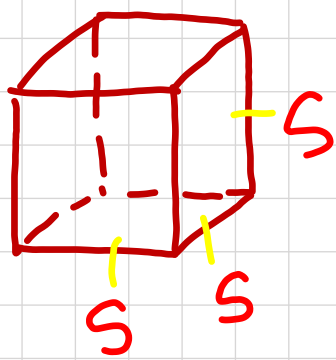
$$AD^2 = AB \times AC$$

$$CD^2 = BC \times AC$$

$$BD^2 = AB \times CB$$

* Bangun Ruang

1) Kubus

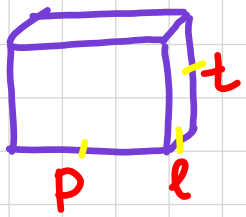


$$\text{Volume Kubus} = s \times s \times s = s^3$$

$$\text{Luas Kubus} = 6 \times s \times s = 6 \times s^2$$

$$\text{Diagonal Ruang} = s\sqrt{3}, \text{ Diagonal sisi} = s\sqrt{2}$$

2) Balok



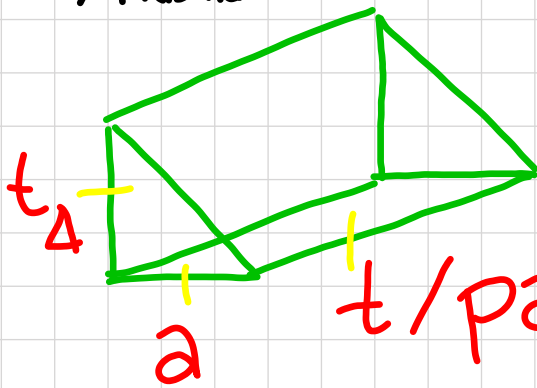
$$\text{Volume} = p \times l \times t$$

$$\text{Luas} = 2 \times (pl + pt + lt)$$

$$\text{Diagonal Ruang} = \sqrt{p^2 + l^2 + t^2}$$

$$\text{Diagonal Sisi} \Rightarrow \text{Pythagoras}$$

3) Prisma

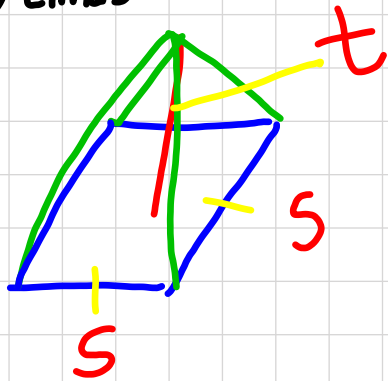


$$\text{Volume} = \text{Luas alas} \times \text{tinggi}$$

$$\text{Luas alas segitiga} = \frac{a \times t}{2}$$

$$\text{Luas prisma} = (2 \times \text{Luas alas}) + (n \times \text{Luas sisi tegak})$$

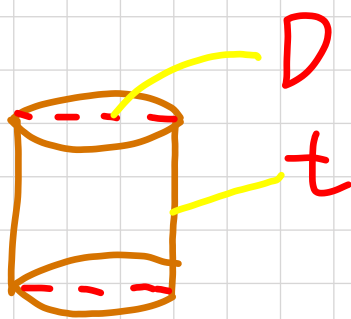
4) Limas



$$\text{Volume} = \frac{1}{3} \times \text{Luas alas} \times t$$

$$\text{Luas} = \text{Luas alas} + (n \times \text{Luas sisi tegak})$$

5) Tabung



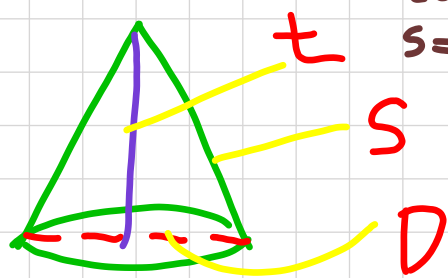
$$\text{Volume} = \pi \times r \times r \times t, \pi = \frac{22}{7} \text{ atau } \pi = 3,14$$

$$\text{Luas} = 2 \times \text{Luas } \odot + \text{L selimut tabung}$$

$$\text{L } \odot = \pi \times r \times r, \text{ Diameter} = 2 \times r$$

$$\text{L selimut tabung} = 2 \times \pi \times r \times t$$

6) Kerucut

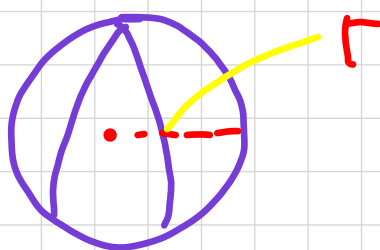


$$\text{Volume} = \frac{1}{3} \times \pi \times r \times r \times t$$

$$\text{Luas} = \text{L } \odot + \text{L selimut kerucut}, \text{ L selimut} = \pi \times r \times s$$

$$s = \text{garis pelukis} \Rightarrow s^2 = r^2 + t^2$$

7) Bola



$$\text{Volume} = \frac{4}{3} \times \pi \times r \times r \times r$$

$$\text{Luas} = 4 \times \text{L } \odot = 4 \times \pi \times r \times r$$

* Statistika

① Mean/Nilai Rata-rata (\bar{x}) = Σ Data / frekuensi, $\bar{x} = \Sigma x / f$

Contoh: 1, 2, 3, 4, 5
Mean = ?

Jawab: $\bar{x} = (1+2+3+4+5)/5 = 15/5 = 3$

② Median/Nilai Tengah (Me)

Letak $Me = (\Sigma F + 1) / 2$

Contoh: 1, 2, 3, 4, 5. Median \Rightarrow Letak = $5+1/2 = 3$ (Data ke 3) yaitu 3 (data harus urut)

③ Modus/Nilai Sering muncul (Mo)

Contoh: 1, 2, 2, 3, 4, 5. Modus = 2 (Frekuensi = 2)

④ Kuartil (Q_n) = Kelas

a. Kelas Bawah (Q_1) b. Kelas tengah (Q_2) c. Kelas Atas (Q_3)

Contoh: 1, 2, 2, 3, 4, 5. Kelas Tengah = Median (dicari dulu)

$Q_2 / Me = 2+3/2 = 2,5$ (antara data ke 3 dan 4)

Q_1 area \Rightarrow 1, 2, 2 \Rightarrow Nilai diambil tengah = 2

Q_3 area \Rightarrow 3, 4, 5 \Rightarrow Nilai diambil Tengah \Rightarrow 4

5) Rata-rata gabungan (\bar{x}_g)

$\bar{x}_g = (\bar{x}_1 \cdot F_1 + \bar{x}_2 \cdot F_2) / \Sigma F$

Contoh: Kelas \bar{x}_A Rata-rata usianya 15 tahun, jumlah siswa 40

Kelas \bar{x}_B Rata-rata usianya 14 tahun

Jumlah siswa 40

Rata-rata gabungannya = ?

Jawab: $\bar{x}_g = \bar{x}_1 \cdot F_1 + \bar{x}_2 \cdot F_2 / \Sigma F$
 $= 15 \times 40 + 14 \times 40 / 80$
 $= 600 + 560 / 80$
 $= 1160 / 80 = 14,5$

* Peluang (P)

* Frekuensi Harapan (FH)

Peluang = n / R_s , $R_s =$ Ruang Sampel = $(Sisi)^{jumlah} = S^j$ FH = Banyak pelemparan x Peluang

Contoh: Ruang Sampel dari 2 Uang Logam \Rightarrow Sisi = 2 < angka gambar

Jumlah uang Logam = 2

Ruang Sampel = $2^2 = 4$

① Peluang muncul 1 Angka dan 1 Gambar pada pelemparan 2 Uang logam adalah ..

Jawab: Ruang Sampel = $2^2 = 4$

$P = n / R_s$

Menentukan n \Rightarrow dengan Δ pascal \Rightarrow pangkat 2 = $(a+b)^2$

$(a+b)^2 = 1 : 2 : 1 = 1A^2 + 2AG + 1G^2$

= 1 Angka, Angka : 2 Angka, Gambar : 1 Gambar, Gambar

② Pelemparan 1 dadu dan 1 Uang Logam, Ruang Sampelnya ?

Jawab: $R_s = UL \times Dadu = 2 \times 6 = 12$

③ Pelemparan 2 dadu, muncul angka yg berjumlah 7 ?

Jawab: Ruang Sampel = $6^2 = 6 \times 6 = 36$

Mata dadu : 1, 2, 3, 4, 5, 6

Jumlah 7 bisa dibentuk dari :

6+1, 1+6

5+2, 2+5 $P = 6/36$

4+3, 3+4 $P = 1/6$

* Matematika Kelas 8 *

Persamaan Kuadrat Baru $\Rightarrow x^2 - (x_1 + x_2) \cdot x + x_1 \cdot x_2$

$$\Rightarrow x_1 + x_2 = -b/a$$

$$\Rightarrow x_1 \cdot x_2 = c/a$$

Contoh Penerapan PK Baru: $2x^2 + 5x + 3$, tentukan PK Baru, jika akarnya $(x_1 + 2)$ dan $(x_2 + 2)$

Jawab: $2x^2 + 5x + 3$, $a=2$, $b=5$, $c=3$

$$\Rightarrow x_1 + x_2 = -b/a = -5/2$$

$$\Rightarrow x_1 \cdot x_2 = c/a = 3/2$$

$$\text{PK Baru} \Rightarrow x^2 - (x_1 + x_2)x + x_1 \cdot x_2$$

$$x^2 - (x_1 + 2 + x_2 + 2)x - (x_1 + 2)(x_2 + 2)$$

$$x^2 - (x_1 + x_2 + 4)x - (x_1 \cdot x_2 + 2(x_1 + x_2) + 4)$$

$$x^2 - (-5/2 + 4)x - (3/2 + 2 \cdot (-5/2) + 4) = x^2 - 3/2x - (3/2 - 5 + 4)$$

$$= \underline{x^2 - 3/2x - 1/2} \cdot (2)$$

$$= 2x^2 - 3x - 1 \text{ (PK Baru)}$$

$$\text{Diskriminan (D)} = b^2 - 4ac$$

Contoh soal diskriminan: Diskriminan dari $2x^2 + 5x + 3$ adalah

Jawab: $a=2$, $b=5$, $c=3$

$$D = 5^2 - 4 \cdot 2 \cdot 3 = 25 - 24 = 1$$

$$\text{Rumus Kuadrat } a, b, c \Rightarrow x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Persamaan kuadrat memiliki 2 akar kembar $\Rightarrow D=0$

Grafik fungsi kuadrat: 1) titik sb x , $y=0$

2) titik sb y , $x=0$

3) sb simetri, $x = -b/2a$

4) TP (T. Puncak) $= (-b/2a, D/-4a)$

* Kurva menyinggung sb x , maka $D=0$

* $x_1 - x_2 = \sqrt{D}/a$, $D = \text{Diskriminan}$

* Pemfaktoran Persamaan Kuadrat *

1) Suku 2 ($x^2 - a^2$)

$$x^2 - 4 \rightarrow \sqrt{x^2} = x, \sqrt{4} = 2$$

$$\rightarrow (x+2)(x-2)$$

2) Suku 3 (koefisien kuadrat sama dengan satu)

$$x^2 + 4x + 4 \rightarrow (x+2)(x+2)$$

$\begin{matrix} 2+2 & 2 \times 2 \end{matrix}$

3) Suku 3 (koefisien variabel kuadrat lebih dari satu)

$$3x^2 + 5x + 2 \rightarrow 3x^2 + \boxed{5x+6} \rightarrow 6 = 3 \times 2$$

⊗

$$5 = 3+2$$

$$(3x+3)(3x+2) \Rightarrow (x+1)(3x+2)$$

✳ Lingkaran ✳

- 1) $L = \pi \times r \times r$ ($\pi = \frac{22}{7}$, $\pi = 3,14$)
 $r = D/2 = \text{Diameter}/2$
- 2) Keliling = $K = D \times \pi$
- 3) Luas Juring = $(\frac{n}{360^\circ}) \times L \odot$
- 4) Busur Lingkaran = $(\frac{n}{360^\circ}) \times K \odot$
- 5) Pedoman $\frac{1}{2} \odot = 180^\circ$ (Pelurus), Pedoman siku $\frac{1}{4} \odot = 90^\circ$ (Penyiku)
- 6) Sudut Bertolak Belakang = Sama besar
- 7) Luas Tembereng = $L \frac{1}{4} \odot - L \Delta = \text{Luas } \frac{1}{2} \text{ daun}$

✳ Perbandingan ✳

- 1) Perbandingan senilai \rightarrow 2 kaos = 3000
3 kaos = ?

$$\frac{2}{3} = \frac{3000}{x}$$

$$2x = 3000(3)$$

$$2x = 9000 \rightarrow x = 4500$$

- 2) Perbandingan Tidak Senilai \rightarrow Makanan dan ternak

2 Bebek = habis makanan 10 hari
5 Bebek = habis makanan ?

$$2 \times 10 = 5 \times H$$
$$4 \cancel{0} = 5H$$
$$4 = H, \text{ Habis dalam 4 hari}$$

- 3) SKALA : (JP : Js) : satuan dalam cm

Jp = Jarak peta, Js = Jarak sesungguhnya

Jp = kecil, Js = Besar

$$\text{Skala} : 1 : 500.000, Jp = 2 \text{ cm}, Js = \frac{2 \times 500.000}{100.000} = 10 \text{ km}$$

- 3) Pekerja dan Hari $\rightarrow \Delta P = \frac{B \cdot O}{S}$, ΔP = tambahan Pekerja
B = Berhenti, O = Orang
S = Sisa Hari

- 4) $A : B$
 $B : C$ $\xrightarrow{1:2}$ $3:4$ dikalikan menjadi $3:6:8$

misalnya = selisih antara B dan C adalah 2, tentukan jumlah A+B+C

$$\frac{A+B+C}{C-B} = \frac{3+6+8}{2} = \frac{17}{\cancel{2} \times 2} = 17$$