



**Address:**  
**JAMBU PERSHAD & SONS**  
6275/22 Nicholson Road,  
Ambala Cantt, Haryana,  
INDIA  
Pin: 133001

**Email:**  
sales@japson.com  
japsonambala@yahoo.com

**Website:**  
www.japson.com  
**Phone:**  
+91-171-4006897

# Understanding Maths, Charts, School Education

## Product Image

**Minute Hand (Long)**  
**Hour Hand (Short)**  
**One Minute**  
**Five Minutes Between Each Number**  
**Second Hand**

**: TIME PERIODS :**  
60 SECONDS in each **MINUTE**  
60 MINUTES in each **HOUR**  
24 HOURS in each **DAY**  
7 DAYS in each **WEEK**  
4 WEEKS in each **MONTH**  
12 MONTHS in each **YEAR**  
100 YEARS in each **CENTURY**  
1000 YEARS in each **MILLENNIUM**

**O' Clock** 6:00 **Morning Time**  
**Quarter Past** 7:15 **School Time**  
**Half Past** 1:30 **Lunch Time**  
**Quarter To** 10:45 **Sleeping Time**

**What's The Time**

**Converting**  
**12 Hour Clock to 24 Hour Clock**

12 Midnight to 12 Noon (a.m.)	
00CC hrs = 12 Midnight	06CC hrs = 6 a.m.
01CC hrs = 1 a.m.	07CC hrs = 7 a.m.
02CC hrs = 2 a.m.	08CC hrs = 8 a.m.
03CC hrs = 3 a.m.	09CC hrs = 9 a.m.
04CC hrs = 4 a.m.	10CC hrs = 10 a.m.
05CC hrs = 5 a.m.	11CC hrs = 11 a.m.
12 Noon to 12 Midnight (p.m.)	
12CC hrs = 12 Noon	06CC hrs = 6 p.m.
13CC hrs = 1 p.m.	07CC hrs = 7 p.m.
14CC hrs = 2 p.m.	08CC hrs = 8 p.m.
15CC hrs = 3 p.m.	09CC hrs = 9 p.m.
16CC hrs = 4 p.m.	10CC hrs = 10 p.m.
17CC hrs = 5 p.m.	11CC hrs = 11 p.m.

# Description

**Standard Size:** 70x100cms, Set of 21 Charts

**Language:** English

Synthetic Charts with Plastic Rollers. These Charts have technically accurate and detailed description in vivid colours.

**Note:** Based on minimum order quantity conditions, Charts can be customized to your requirements in terms of CONTENT, LANGUAGE, SIZE, etc. Please write back to us for discussion.

## A. Charts, Trigonometry

**Trigonometry**

Trigonometry is the study of relationships between the sides and angles of a triangle. The word trigonometry is derived from the Greek words 'TRI' meaning three, and 'METRON' meaning measure, and TRIGONON (meaning measure).

Triangle of most interest in trigonometry is right-angled triangle. If an angle of a right-angled triangle is considered as  $\theta$ , then

- Side opposite to right angle is **Hypotenuse**
- Side opposite to angle  $\theta$  is **Perpendicular**
- Side adjacent to angle  $\theta$  is **Base**

**TRIGONOMETRIC RATIOS OF ACUTE ANGLE  $\theta$  IN A RIGHT TRIANGLE**

S. No.	Trigonometric Functions	Ratios	Symbolic forms
1.	Sine $\theta$ or (Sin $\theta$ )	Length of Perpendicular / Length of Hypotenuse	$\frac{P}{H}$
2.	Cosine $\theta$ or (Cos $\theta$ )	Length of Base / Length of Hypotenuse	$\frac{B}{H}$
3.	Tangent $\theta$ or (Tan $\theta$ )	Length of Perpendicular / Length of Base	$\frac{P}{B}$
4.	Cosecant $\theta$ or (Cosec $\theta$ )	Hypotenuse / Perpendicular	$\frac{H}{P}$
5.	Secant $\theta$ or (Sec $\theta$ )	Hypotenuse / Base	$\frac{H}{B}$
6.	Cotangent $\theta$ or (Cot $\theta$ )	Base / Perpendicular	$\frac{B}{P}$

**APPLICATIONS OF TRIGONOMETRY**

- Measuring heights of towers
- Measuring the distance between two points
- Measuring the width of a river
- Measuring the height of a building
- Measuring the distance between two points
- Measuring the height of a mountain
- Measuring the distance between two points
- Measuring the height of a building
- Measuring the distance between two points

## B. Charts, Trigonometric Identities

**Trigonometric Identities**

Reciprocal Identities	Quotient Identities	Pythagorean Identities
$\sin \theta = \frac{1}{\text{cosec } \theta}$ $\cos \theta = \frac{1}{\text{sec } \theta}$ $\tan \theta = \frac{1}{\text{cot } \theta}$	$\tan \theta = \frac{\sin \theta}{\cos \theta}$ $\cot \theta = \frac{\cos \theta}{\sin \theta}$	$\sin^2 \theta + \cos^2 \theta = 1$ $1 + \tan^2 \theta = \sec^2 \theta$ $1 + \cot^2 \theta = \text{cosec}^2 \theta$
Cofunction Identities	Periodic Identities	
$\sin\left(\frac{\pi}{2} - \theta\right) = \cos \theta$ $\cos\left(\frac{\pi}{2} - \theta\right) = \sin \theta$ $\tan\left(\frac{\pi}{2} - \theta\right) = \cot \theta$ $\cot\left(\frac{\pi}{2} - \theta\right) = \tan \theta$	$\sin(\theta + 2\pi) = \sin \theta$ $\cos(\theta + 2\pi) = \cos \theta$ $\tan(\theta + \pi) = \tan \theta$ $\cot(\theta + \pi) = \cot \theta$	
Sum & Difference Identities	Law of Sines	
$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$ $\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$ $\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$ $\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	
Sum to Product Identities	Law of Cosines	
$\sin \alpha + \sin \beta = 2 \sin\left(\frac{\alpha + \beta}{2}\right) \cos\left(\frac{\alpha - \beta}{2}\right)$ $\sin \alpha - \sin \beta = 2 \cos\left(\frac{\alpha + \beta}{2}\right) \sin\left(\frac{\alpha - \beta}{2}\right)$ $\cos \alpha + \cos \beta = 2 \cos\left(\frac{\alpha + \beta}{2}\right) \cos\left(\frac{\alpha - \beta}{2}\right)$ $\cos \alpha - \cos \beta = -2 \sin\left(\frac{\alpha + \beta}{2}\right) \sin\left(\frac{\alpha - \beta}{2}\right)$	$c^2 = a^2 + b^2 - 2ab \cos C$	
Product to Sum Identities	Double Angle Identities	
$2 \sin \alpha \cos \beta = \cos(\alpha - \beta) + \cos(\alpha + \beta)$ $2 \cos \alpha \sin \beta = \sin(\alpha + \beta) - \sin(\alpha - \beta)$ $2 \sin \alpha \sin \beta = \cos(\alpha - \beta) - \cos(\alpha + \beta)$ $2 \cos \alpha \cos \beta = \cos(\alpha - \beta) + \cos(\alpha + \beta)$	$\sin(2\theta) = 2 \sin \theta \cos \theta$ $\cos(2\theta) = \cos^2 \theta - \sin^2 \theta$ $\tan(2\theta) = \frac{2 \sin \theta \cos \theta}{\cos^2 \theta - \sin^2 \theta}$	
	Half Angle Identities	
	$\sin\left(\frac{\theta}{2}\right) = \pm \sqrt{\frac{1 - \cos \theta}{2}}$ $\cos\left(\frac{\theta}{2}\right) = \pm \sqrt{\frac{1 + \cos \theta}{2}}$ $\tan\left(\frac{\theta}{2}\right) = \pm \sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}}$	
	Triple Angle Identities	
	$\sin(3\theta) = 3 \sin \theta - 4 \sin^3 \theta$ $\cos(3\theta) = 4 \cos^3 \theta - 3 \cos \theta$ $\tan(3\theta) = \frac{3 \tan \theta - \tan^3 \theta}{1 - 3 \tan^2 \theta}$	

## C. Charts, Probability

## D. Charts, Number Pattern

## Probability

Probability is Used in Everyday Life to Predict the Chance of Things Happening  
Probability is Measured on a Scale of 0 to 1  $0 \leq P(E) \leq 1$

Probability of an impossible event is 0 to 1  
**Example:** Probability of getting number 7 in a single throw of a die  
 $P(E) = 0$

Probability of sure event is 1 to 1  
**Example:** Probability of getting a number less than 7 in a single throw of a die  
 $P(E) = 6/6 = 1$

The probability of getting a 6 when rolling a fair die  
 $P(6) = 1/6$

Probability of getting an ace when one card is drawn from a well-shuffled deck of 52 cards  
 $P(\text{Ace}) = 4/52 = 1/13$

Probability of getting a green marble from the jar containing 10 green, 8 red & 4 blue marbles  
 $P(\text{Green}) = 10/28 = 5/14$

### Tree Diagram Showing Probability of an Event

Using a tree diagram helps to solve probability problems involving combined events

First Toss	Second Toss	Outcome	Probability
Head	Head	Head	$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$
		Tail	$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$
Tail	Head	Head	$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$
		Tail	$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

When the outcome of one event does not affect the outcome of another, the events are independent.

## Number Patterns

A PATTERN IS FORMED WHEN THERE IS A COMMON RELATIONSHIP IN A LIST OF NUMBERS.

### Triangular numbers

1, 3, 6, 10, 15, 21, 28, 36, 45, 55, 66, 78, 91, 105, 120, 136, 153, 171, 190, 210, 231, 253, 276, 300, 325, 351, 378, 406, 435, 465, 496, 528, 561, 595, 630, 666, 703, 741, 780, 820, 861, 903, 946, 990, 1035, 1081, 1128, 1176, 1225, 1275, 1326, 1378, 1431, 1485, 1540, 1596, 1653, 1711, 1770, 1830, 1891, 1953, 2016, 2080, 2145, 2211, 2278, 2346, 2415, 2485, 2556, 2628, 2701, 2775, 2850, 2926, 3003, 3081, 3160, 3240, 3321, 3403, 3486, 3570, 3655, 3741, 3828, 3916, 4005, 4095, 4186, 4278, 4371, 4465, 4560, 4656, 4753, 4851, 4950, 5050, 5151, 5253, 5356, 5460, 5565, 5671, 5778, 5886, 5995, 6105, 6216, 6328, 6441, 6555, 6670, 6786, 6903, 7021, 7140, 7260, 7381, 7503, 7626, 7750, 7875, 8001, 8128, 8256, 8385, 8515, 8646, 8778, 8911, 9045, 9180, 9316, 9453, 9591, 9730, 9870, 10011, 10153, 10296, 10440, 10585, 10731, 10878, 11026, 11175, 11325, 11476, 11628, 11781, 11935, 12090, 12246, 12403, 12561, 12720, 12880, 13041, 13203, 13366, 13530, 13695, 13861, 14028, 14196, 14365, 14535, 14706, 14878, 15051, 15225, 15400, 15576, 15753, 15931, 16110, 16290, 16471, 16653, 16836, 17020, 17205, 17391, 17578, 17766, 17955, 18145, 18336, 18528, 18721, 18915, 19110, 19306, 19503, 19701, 19900, 20100, 20301, 20503, 20706, 20910, 21115, 21321, 21528, 21736, 21945, 22155, 22366, 22578, 22791, 23005, 23220, 23436, 23653, 23871, 24090, 24310, 24531, 24753, 24976, 25200, 25425, 25651, 25878, 26106, 26335, 26565, 26796, 27028, 27261, 27495, 27730, 27966, 28203, 28441, 28680, 28920, 29161, 29403, 29646, 29890, 30135, 30381, 30628, 30876, 31125, 31375, 31626, 31878, 32131, 32385, 32640, 32896, 33153, 33411, 33670, 33930, 34191, 34453, 34716, 34980, 35245, 35511, 35778, 36046, 36315, 36585, 36856, 37128, 37401, 37675, 37950, 38226, 38503, 38781, 39060, 39340, 39621, 39903, 40186, 40470, 40755, 41041, 41328, 41616, 41905, 42195, 42486, 42778, 43071, 43365, 43660, 43956, 44253, 44551, 44850, 45150, 45451, 45753, 46056, 46360, 46665, 46971, 47278, 47586, 47895, 48205, 48516, 48828, 49141, 49455, 49770, 50086, 50403, 50721, 51040, 51360, 51681, 52003, 52326, 52650, 52975, 53301, 53628, 53956, 54285, 54615, 54946, 55278, 55611, 55945, 56280, 56616, 56953, 57291, 57630, 57970, 58311, 58653, 59096, 59540, 60085, 60631, 61178, 61726, 62275, 62825, 63376, 63928, 64481, 65035, 65590, 66146, 66703, 67261, 67820, 68380, 68941, 69503, 70066, 70630, 71195, 71761, 72328, 72896, 73465, 74035, 74606, 75178, 75751, 76325, 76900, 77476, 78053, 78631, 79210, 79790, 80371, 80953, 81536, 82120, 82705, 83291, 83878, 84466, 85055, 85645, 86236, 86828, 87421, 88015, 88610, 89206, 89803, 90401, 91000, 91600, 92201, 92803, 93406, 94010, 94615, 95221, 95828, 96436, 97045, 97655, 98266, 98878, 99491, 100105, 100720, 101336, 101953, 102571, 103190, 103810, 104431, 105053, 105676, 106300, 106925, 107551, 108178, 108806, 109435, 110065, 110696, 111328, 111961, 112595, 113230, 113866, 114503, 115141, 115780, 116420, 117061, 117703, 118346, 118990, 119635, 120281, 120928, 121576, 122225, 122875, 123526, 124178, 124831, 125485, 126140, 126796, 127453, 128111, 128770, 129430, 130091, 130753, 131416, 132080, 132745, 133411, 134078, 134746, 135415, 136085, 136756, 137428, 138101, 138775, 139450, 140126, 140803, 141481, 142160, 142840, 143521, 144203, 144886, 145570, 146255, 146941, 147628, 148316, 149005, 149695, 150386, 151078, 151771, 152465, 153160, 153856, 154553, 155251, 155950, 156650, 157351, 158053, 158756, 159460, 160165, 160871, 161578, 162286, 162995, 163705, 164416, 165128, 165841, 166555, 167270, 167986, 168703, 169421, 170140, 170860, 171581, 172303, 173026, 173750, 174475, 175201, 175928, 176656, 177385, 178115, 178846, 179578, 180311, 181045, 181780, 182516, 183253, 183991, 184730, 185470, 186211, 186953, 187696, 188440, 189185, 189931, 190678, 191426, 192175, 192925, 193676, 194428, 195181, 195935, 196690, 197446, 198203, 198961, 199720, 200480, 201241, 202003, 202766, 203530, 204295, 205061, 205828, 206596, 207365, 208135, 208906, 209678, 210451, 211225, 212000, 212776, 213553, 214331, 215110, 215890, 216671, 217453, 218236, 219020, 219805, 220591, 221378, 222166, 222955, 223745, 224536, 225328, 226121, 226915, 227710, 228506, 229303, 230101, 230900, 231700, 232501, 233303, 234106, 234910, 235715, 236521, 237328, 238136, 238945, 239755, 240566, 241378, 242191, 243005, 243820, 244636, 245453, 246271, 247090, 247910, 248731, 249553, 250376, 251200, 252025, 252851, 253678, 254506, 255335, 256165, 256996, 257828, 258661, 259495, 260330, 261166, 262003, 262841, 263680, 264520, 265361, 266203, 267046, 267890, 268735, 269581, 270428, 271276, 272125, 272975, 273826, 274678, 275531, 276385, 277240, 278096, 278953, 279811, 280670, 281530, 282391, 283253, 284116, 284980, 285845, 286711, 287578, 288446, 289315, 290185, 291056, 291928, 292801, 293675, 294550, 295426, 296303, 297181, 298060, 298940, 299821, 300703, 301586, 302470, 303355, 304241, 305128, 306016, 306905, 307795, 308686, 309578, 310471, 311365, 312260, 313156, 314053, 314951, 315850, 316750, 317651, 318553, 319456, 320360, 321265, 322171, 323078, 323986, 324895, 325805, 326716, 327628, 328541, 329455, 330370, 331286, 332203, 333121, 334040, 334960, 335881, 336803, 337726, 338650, 339575, 340501, 341428, 342356, 343285, 344215, 345146, 346078, 347011, 347945, 348880, 349816, 350753, 351691, 352630, 353570, 354511, 355453, 356396, 357340, 358285, 359231, 360178, 361126, 362075, 363025, 363976, 364928, 365881, 366835, 367790, 368746, 369703, 370661, 371620, 372580, 373541, 374503, 375466, 376430, 377395, 378361, 379328, 380296, 381265, 382235, 383206, 384178, 385151, 386125, 387100, 388076, 389053, 390031, 391010, 391990, 392971, 393953, 394936, 395920, 396905, 397891, 398878, 399866, 400855, 401845, 402836, 403828, 404821, 405815, 406810, 407806, 408803, 409801, 410800, 411800, 412801, 413803, 414806, 415810, 416815, 417821, 418828, 419835, 420843, 421852, 422862, 423873, 424884, 425896, 426909, 427923, 428938, 429953, 430969, 431986, 433003, 434021, 435040, 436060, 437081, 438103, 439126, 440150, 441175, 442201, 443228, 444256, 445285, 446315, 447346, 448378, 449411, 450445, 451480, 452516, 453553, 454591, 455630, 456670, 457711, 458753, 459796, 460840, 461885, 462931, 463978, 465026, 466075, 467125, 468176, 469228, 470281, 471335, 472390, 473446, 474503, 475561, 476620, 477680, 478741, 479803, 480866, 481930, 482995, 484061, 485128, 486196, 487265, 488335, 489406, 490478, 491551, 492625, 493700, 494776, 495853, 496931, 498010, 499090, 500171, 501253, 502336, 503420, 504505, 505591, 506678, 507766, 508855, 509945, 511036, 512128, 513221, 514315, 515410, 516506, 517603, 518701, 519800, 520900, 522001, 523103, 524206, 525310, 526415, 527521, 528628, 529736, 530845, 531955, 533066, 534178, 535291, 536405, 537520, 538636, 539753, 540871, 541990, 543110, 544231, 545353, 546476, 547600, 548725, 549851, 550978, 552106, 553235, 554365, 555496, 556628, 557760, 558893, 560027, 561162, 562298, 563435, 564573, 565712, 566852, 567993, 569135, 570278, 571422, 572567, 573713, 574860, 576008, 577157, 578307, 579458, 580610, 581763, 582917, 584072, 585228, 586385, 587543, 588702, 589862, 591023, 592185, 593348, 594512, 595677, 596843, 598010, 599178, 600347, 601517, 602688, 603860, 605033, 606207, 607382, 608558, 609735, 610913, 612092, 613272, 614453, 615635, 616818, 617992, 619167, 620343, 621520, 622698, 623877, 625057, 626238, 627420, 628603, 629787, 630972, 632158, 633345, 634533, 635722, 636912, 638103, 639295, 640488, 641682, 642877, 644073, 645270, 646468, 647667, 648867, 650068, 651270, 652473, 653677, 654882, 656088, 657295, 658503, 659712, 660922, 662133, 663345, 664558, 665772, 666987, 668203, 669420, 670638, 671857, 673077, 674298, 675520, 676743, 677967, 679192, 680418, 681645, 682873, 684102, 685332, 686563, 687795, 689028, 690262, 691497, 692733, 693970, 695208, 696447, 697687, 698928, 700170, 701413, 702657, 703902, 705148, 706395, 707643, 708892, 710142, 711393, 712645, 713898, 715152, 716407, 717663, 718920, 720178, 721437, 722697, 723958, 725220, 726483, 727747, 729012, 730278, 731545, 732813, 734082, 735352, 736623, 737895, 739168, 740442, 741717, 742993, 744270, 745548, 746827, 748107, 749388, 750670, 751953, 753237, 754522, 755808, 757095, 758383, 759672, 760962, 762253, 763545, 764838, 766132, 767427, 768723, 770020, 771318, 772617, 773917, 775218, 776520, 777823, 779127, 780432, 781738, 783045, 784353, 785662, 786972, 788283, 789595, 790908, 792222, 793537, 794853, 796170, 797488, 798807, 800127, 801448, 802770, 804093, 805417, 806742, 808068, 809395, 810723, 812052, 813382, 814713, 816045, 817378, 818712, 820047, 821383, 822720, 824058, 825397, 826737, 828078, 829420, 830763, 832107, 833452, 834798, 836145, 837493, 838842, 840192, 841543, 842895, 844248, 845602, 846957, 848313, 849670, 851028, 852387, 853747, 855108, 856470, 857833, 859197, 860562, 861928, 863295, 864663, 866032, 867402, 868773, 870145, 871518, 872892, 874267, 875643, 877020, 878398, 879777, 881157, 882538, 883920, 885303, 886687, 888072, 889458, 890845, 892233, 893622, 895012, 896403, 897795, 899188, 900582, 901977, 903373, 904770, 906168, 907567, 908967, 910368, 911770, 913173, 914577, 915982, 917388, 918795, 920203, 921612, 923022, 924433, 925845, 927258, 928672, 930087, 931503, 932920, 934338, 935757, 937177, 938598, 940020, 941443, 942867, 944292, 945718, 947145, 948573, 950002, 951432, 952863, 954295, 955728, 957162, 958597, 960033, 961470, 962908, 964347, 965787, 967228, 968670, 970113, 971557, 973002, 974448, 975895, 977343, 978792, 980242, 981693, 983145, 984598, 986052, 987507, 988963, 990420, 991878, 993337, 994797, 996258, 997720, 999183, 1000647, 1002112, 1003578, 1005045, 1006513, 1007982, 1009452, 1010923, 1012395, 1013868, 1015342, 1016817, 1018293, 1019770, 1021248, 1022727, 1024207, 1025688, 1027170, 1028653, 1030137, 1031622, 1033108, 1034595, 1036083, 1037572, 1039062, 1040553, 1042045, 1043538, 1045032, 1046527, 1048023, 1049520, 1051018, 1052517, 1054017, 1055518, 1057020, 1058523, 1060027, 1061532, 1063038, 1064545, 1066053, 1067562, 1069072, 1070583, 1072095, 1073608, 1075122, 1076637, 1078153, 1079670, 1081188, 1082707, 1084227, 1085748, 1087270, 1088793, 1090317, 1091842, 1093368, 1094895, 1096423, 1097952, 1099482, 1101013, 1102545, 1104078, 1105612, 1107147, 1108683, 1110220, 1111758, 1113297, 1114837, 1116378, 1117920, 1119463, 1121007, 1122552, 1124098, 1125645, 1127193, 1128742, 1130292, 1131843, 1133395, 1134948, 1136502, 1138057, 1139613, 1141170, 1142728, 1144287, 1145847, 1147408, 1148970, 1150533, 1152097, 1153662, 1155228, 1156795, 1158363, 1159932, 1161502, 1163073, 1164645, 1166218, 1167792, 1169367, 1170943, 1172520, 1174098, 1175677, 1177257, 1178838, 1180420, 1182003, 1183587, 1185172, 1186758, 1188345, 1189933, 1191522, 1193112, 1194703, 1196295, 1197888, 1199482, 1201077, 1202673, 1204270, 1205868, 1207467, 1209067, 1210668, 1212270, 1213873, 1215477, 1217082, 1218688, 1220295, 1221903, 1223512, 1225122, 1226733, 1228345, 1229958, 1231572, 1233187, 1234803, 1236420, 1238038, 1239657, 1241277, 1242898, 1244520, 1246143, 1247767, 1249392, 1251018, 1252645, 1254273, 1255902, 1257532, 1259163, 1260795, 1262428, 1264062, 1265697, 1267333, 1268970, 1270608, 1272247, 1273887, 1275528, 1277170, 1278813, 1280457, 1282102, 1283748, 1285395, 1287043, 1288692, 1290342, 1291993, 1293645, 1295298, 1296952, 1298607, 1300263, 1301920, 1303578, 1305237, 1306897, 1308558, 1310220, 1311883, 1313547, 1315212, 1316878, 1318545, 1320213, 1321882, 1323552, 1325223, 1326895, 1328568, 1330242, 1331917, 1333593, 1335270, 1336948, 1338627, 1340307, 1341988, 1343670, 1345353, 1347037, 13

## Measures of Central Tendency

A measure of central tendency is a single value that attempts to describe a set of data by identifying the central position within that set of data.

### MEAN

The Mean of  $n$  number of observations  $(x_1, x_2, x_3, \dots, x_n)$  is the sum of the values of all the observations divided by the total number of observations ( $n$ ). Mean is denoted by  $\bar{x}$ .

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} \quad \text{or} \quad \bar{x} = \frac{\sum x_i}{n}$$

Marks scored out of 100 by a student in different subjects are:

Maths	English	Geography	Biology	Art	Music	Sports
80	92	78	92	92	71	53

Mean of Marks =  $(80 + 92 + 78 + 92 + 65 + 62 + 5 + 652) \div 8 = 81.5$

### MEDIAN

Median is the middle-most value in a set of data. It is the value which divides the data into two equal halves.

If it is an odd number, then Median  $(M_d) =$  value of  $(\frac{n+1}{2})^{\text{th}}$  observation.

If it is an even number, then Median  $(M_d) =$  Mean of  $(\frac{n}{2})^{\text{th}}$  and  $(\frac{n}{2} + 1)^{\text{th}}$  observation.

Mus	Art	English	HERDI	SPORTS	Maths	Biology	Geography
65	71	78	80	82	92	92	92

Median = Mean of 4th and 5th value, i.e. =  $80 + 82 \div 2 = 81$

### MODE

MODE is the most frequently occurring value in a data set.

Maths	Biology	Geography
92	92	92

Mode  $(M_o) = 92$

### RANGE

THE RANGE of a data set is the difference between the highest and the lowest data values.

The range gives a measure of the spread of the data.

Maths	92
Minimum	53

Range of Marks =  $(92) - (53) = 39$

## Coordinate Geometry

### Coordinates Plane

A Cartesian coordinate system is a two-dimensional system of axes. The horizontal axis is called the x-axis and the vertical axis is called the y-axis. The point where the x-axis and y-axis intersect is called the origin, which is denoted by the letter O. The distance from the origin to any point is called the coordinates.

### Locating a Point on the Coordinate Plane

Points in one dimension (1D) are located by a number on the line. In two dimensions (2D), a point is located by its coordinates. The coordinates of a point are the horizontal distance from the origin and the vertical distance from the origin.

### Distance between Two Points

The distance between two points  $(x_1, y_1)$  and  $(x_2, y_2)$  is given by:

$$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

### Area of a Triangle

The area of the triangle formed by the points  $(x_1, y_1)$ ,  $(x_2, y_2)$ , and  $(x_3, y_3)$  is:

$$A_{\Delta ABC} = \frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$$

### Slope of a Line

If  $m$  is the gradient of a line, then  $m$  is called the slope or gradient of the line. The slope of a line is denoted by  $m$ .

$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

### Equation of the Line Segment

The coordinates of the P(x) which divides the line segment joining the points  $(x_1, y_1)$  and  $(x_2, y_2)$  internally in the ratio  $m:n$  is:

$$P(x, y) = \left( \frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right)$$

I. Charts, Simple Equations

J. Charts, Graph of Trigonometric Functions

## Simple Equations

An equation is a condition on a variable. It is like a weighing balance with equal weights in its two pans. Left hand side and the right hand side of the equation represent the same amount.

Let's form an equation for finding number of apples in the bag. Each of the apple weighs the same amount and are alike. The weight of apple is represented by variable  $x$ . It is given that weight of three extra apples added to the weight of the bag equals the weight of eight apples.

Written algebraically this is:

$$x + 3 = 8$$

### Solving Equation

To solve the equation, we need to find the value of the variable  $x$  by performing the same operation on each side.

- Step 1: Subtract 3 from both sides.
 
$$x + 3 - 3 = 8 - 3$$

$$x = 5$$
- Step 2: Verify the solution.
 
$$x + 3 = 5 + 3 = 8$$

## Graph of Trigonometric Functions

<p>Graph of <math>y = \sin x</math></p> <p>Domain: all real numbers Range: <math>[-1, 1]</math> Period: <math>2\pi</math></p>	<p>Graph of <math>y = \cos x</math></p> <p>Domain: all real numbers Range: <math>[-1, 1]</math> Period: <math>2\pi</math></p>
<p>Graph of <math>y = \tan x</math></p> <p>Domain: all real numbers except <math>x = \frac{\pi}{2} + n\pi</math> Range: <math>(-\infty, \infty)</math> Period: <math>\pi</math></p>	<p>Graph of <math>y = \cot x</math></p> <p>Domain: all real numbers except <math>x = n\pi</math> Range: <math>(-\infty, \infty)</math> Period: <math>\pi</math></p>
<p>Graph of <math>y = \text{cosec } x</math></p> <p>Domain: all real numbers except <math>x = n\pi</math> Range: <math>(-\infty, -1] \cup [1, \infty)</math> Period: <math>2\pi</math></p>	<p>Graph of <math>y = \sec x</math></p> <p>Domain: all real numbers except <math>x = \frac{\pi}{2} + n\pi</math> Range: <math>(-\infty, -1] \cup [1, \infty)</math> Period: <math>2\pi</math></p>

K. Charts, Similarity and Congruency

L. Charts, Sets

## Similarity and Congruency

### Similarity

Two figures having same shape and not necessarily the same size are called similar figures.

Figures shown in same colour are similar.

#### Similar Triangles

Two triangles are similar, if  
 (i) Their corresponding angles are equal and  
 (ii) Their corresponding sides are in the same ratio.

Figures shown in same colour are congruent.

#### Conditions for Similarity of Two Triangles

AAA similarity, SSS similarity, SAS similarity.

### Congruency

Two figures are congruent if they have the same shape and the same size. Congruent figures match exactly when one figure is placed top of the other.

Overlapping congruent figures have the same length.

#### Congruent Triangles

Two triangles are congruent if their corresponding sides and corresponding angles are equal.

#### Conditions for Congruency of Two Triangles

SSS, SAS, ASA, AAS, RHS.

## Sets

A set is a well-defined collection of objects. A set can contain any number of members or objects and these are called **elements**.

Sets are usually denoted as capital letters A, B, X, Y etc. The elements of a set are written inside curly brackets.

U = Universal set  
 U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}

Set A = {1, 3, 5, 7, 9, 11}  
 Set B = {2, 4, 6, 8, 10, 12}

### Two Methods of Representing a Set

**ROSTER OR TABULAR FORM**: all elements of a set are listed, separated by commas and enclosed within braces { }.

**SET BUILDER FORM**: all elements of a set possess a single common property and are enclosed by element symbol and a property.

### UNION (A ∪ B)

A union of two sets A and B is the set of all elements which are in A or in B or in both A and B.

### INTERSECTION (A ∩ B)

Intersection of two sets A and B is the set of all elements which are common to both A and B.

### SUBSETS (⊂)

When all the elements of set B are contained within set A, then B is a subset of A.

### COMPLEMENT (A')

A region complement of A, in other words, all elements which are not in A.

M. Charts, Interest And Depreciation

N. Charts, Solids and Their Nets

## Interest and Depreciation

### SIMPLE INTEREST

Interest Paid on the Principal Only and not on any Accumulated Interest.

Simple Interest =  $\frac{\text{Principal} \times \text{Time} \times \text{Rate of Interest}}{100}$

**COMPOUND INTEREST**

Basic Principle of Compound Interest is Earning Additional Interest on Interest.

$A = P \left(1 + \frac{r}{100}\right)^n$        $C.I. = A - P$

### DEPRECIATION

Decrease in Value of Assets Over a Period of Time.

$A = P \left(1 - \frac{r}{100}\right)^n$        $D = P - A$

## Solids and Their Nets

A solid 3D figure has its surface (faces), line segments of its skeleton (edges), and corners (vertices).

A net is a skeleton-outline of a solid that can be folded to make it. The same solid can have several type of nets. The total surface area of a solid figure is equal to the total area of its net.

O. Charts, Inequalities

P. Charts, HCF and LCM

## Inequalities

In an equation the '=' sign means the two sides are identical. But what happens when the two sides are not equal? Well in this case you need some Inequalities to show the relationship between the two sides.

$<$  Means 'less than'       $\leq$  means 'less than or equal to'  
 $>$  means 'greater than'       $\geq$  means 'greater than or equal to'

**Example**  
 If  $a = 3$ , then  $\mathbb{N} = 4, 5, 6, 7, \dots$  ( $\mathbb{N}$  is greater than, but not equal to 3, so can't include the 3).  
 If  $y \leq 6$  then  $y = \dots -3, -1, 1, 2, 3, 4, 5, 6$  ( $y$  is less than or equal to 6, so do include the 6).

### Plotting Inequalities on Number Line

Inequalities can be represented on a number line.

Use a hollow dot for  $<$  and  $>$       Use a solid dot for  $\leq$  and  $\geq$

$x < 2$        $x \geq -1$

### Solving Inequalities Using Graphs

Below is a table showing regions defined by inequalities.

Graph showing $x < 1$	Graph showing $y > 2$	Graph showing both $x < 1$ and $y > 2$
Solid line shows that the boundary is included.	Circle the area that the boundary is not included.	Change area shows where both inequalities are true.

## HCF and LCM

### Common Factors and Highest Common Factor

When we multiply two or more numbers, we get a product. These numbers are called the factors of the product.

Factors of 12:  $1 \times 12, 2 \times 6, 3 \times 4$   
 Factors of 24:  $1 \times 24, 2 \times 12, 3 \times 8, 4 \times 6$

Factors of 15:  $1 \times 15, 3 \times 5$   
 Factors of 30:  $1 \times 30, 2 \times 15, 3 \times 10, 5 \times 6$

**HCF** is the Highest Common Factor of 15 and 30.

### Common Multiples and Least Common Multiple

When we multiply a number by an integer we get a multiple.

Multiples of 12:  $12, 24, 36, 48, 60, 72, 84, 96, 108, 120$   
 Multiples of 15:  $15, 30, 45, 60, 75, 90, 105, 120$

**LCM** is the Least Common Multiple (LCM) of 12 and 15.

Q. Charts, Transformation Geometry

R. Charts, Fractions, Decimal & Percentage

## Transformation Geometry

Transformation Geometry involves moving a pre-image in the coordinate plane and transforming it in some way to produce an image.

### TWO DIFFERENT CATEGORIES OF TRANSFORMATION

- Rigid Transformation**: The pre-image and the image both have the exact size and shape.
- Non-Rigid Transformation**: The size is changed but not the shape of the pre-image.

### TYPES OF RIGID TRANSFORMATIONS

- Reflection**: Flipping a pre-image across a line without changing its size or shape.
  - Reflection across  $x = 1$ :  $T(x, y) = (2 - x, y)$
  - Reflection across  $y = 2$ :  $T(x, y) = (x, 4 - y)$
  - Reflection across  $x = 3$ :  $T(x, y) = (6 - x, y)$
- Rotation**: Turning a pre-image about fixed point known as centre of rotation without changing its size or shape.
  - Rotation  $90^\circ$  counter-clockwise:  $T(x, y) = (-y, x)$
- Translation**: Moving a pre-image in some direction without changing its size, shape or orientation.
  - Translation:  $T(x, y) = (x + a, y + b)$
- Glide Reflection**: A combined transformation of a reflection followed by a translation parallel to the line of reflection. It is called a glide reflection.

### TYPES OF NON-RIGID TRANSFORMATIONS

**Dilation**: Copying or stretching a pre-image without changing its shape or orientation.

The real rectangle is the image of the blue rectangle. The scale factor is 3 and the center of enlargement is C.

The real square is the image of the blue square. The scale factor is  $1/2$  and the centre of enlargement is C.

## Fractions, Decimal & Percentage

### FRACTIONS

A fraction is a Part of a Whole.

Proper fraction:  $1/2$   
 Improper fraction:  $4/5$   
 Mixed Number:  $7/20$

### PERCENTAGE

Percent Simply Means **Per Hundred**. Percent is a Ratio that Compares a Number to 100.

### DECIMAL

Decimal Numbers are Another Way of Writing Fraction Numbers.

Number	As a Fraction	As a Percentage
0.05	$5/100$	5%
0.25	$25/100$	25%
0.50	$50/100$	50%
0.75	$75/100$	75%
1.00	$100/100$	100%

### CHANGING FRACTION TO PERCENT TO DECIMAL

Fraction  $\rightarrow$  Percent: Multiply by 100, Divide by 100, Add % sign.  
 Percent  $\rightarrow$  Fraction: Divide by 100, Remove % sign, Simplify.  
 Fraction  $\rightarrow$  Decimal: Divide by 100, Remove % sign, Add 0's, Add a 0's.  
 Decimal  $\rightarrow$  Fraction: Multiply by 100, Remove % sign, Add 0's, Add a 0's, Simplify.

S. Charts, Date Handling

T. Charts, Ratio And Proportion

# Data Handling

All data give us some sort of information. The collection, recording and presentation of data help us organise our experiences and draw inferences from them.

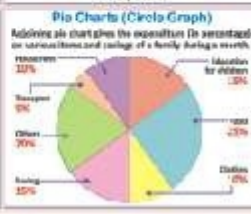
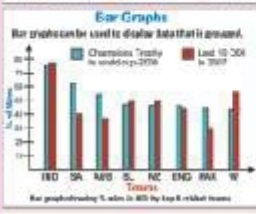
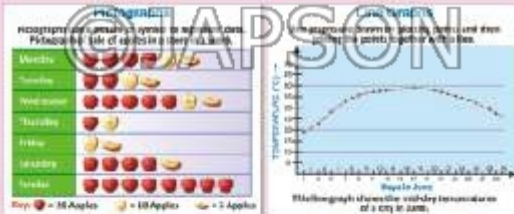
## ORGANISATION OF DATA

A class teacher organises data of students' performance in maths as follows:

Marks Obtained	Tally Marks	Number of Students	Marks Obtained	Tally Marks	Number of Students
0 - 10		5	90 - 100		5
10 - 20		1	80 - 90		5
20 - 30		4	70 - 80		5
30 - 40		4	60 - 70		5
40 - 50		5	50 - 60		5

Above frequency distribution table enables the teacher to analyse the performance of class more clearly.

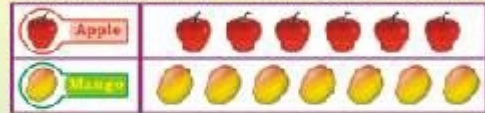
## DISPLAYING DATA



# Ratio and Proportion

## Ratio

A ratio is a comparison of two numbers. These numbers are called the terms of the ratio.



- STEP 1** Count the number of apples - 6 and Count the number of mangoes - 7
- STEP 2** With a ratio to compare, Ratio can be written in three different ways

Ratio	Fraction Form	Word Form	Using a Colon
Apples to Mangoes	$\frac{6}{7}$	6 to 7	6 : 7
Mangoes to the total number of fruits	$\frac{7}{13}$	7 to 13	7 : 13
Apples to the total number of fruits	$\frac{6}{13}$	6 to 13	6 : 13

## Proportion

A proportion is an equation showing that two ratios are equal. Ratios that are equal to each other are called equivalent ratios.



- The above situations show equivalent ratios.
- The ratio is 1:2 or  $\frac{1}{2}$
- If there are 2 tents and 4 children, the ratio is 2:4 or  $\frac{2}{4}$
- If there are 3 tents and 6 children, the ratio is 3:6 or  $\frac{3}{6}$

All these ratios are equivalent. Because  $\frac{2}{4} = \frac{1}{2}$ ,  $\frac{3}{6} = \frac{1}{2}$ .

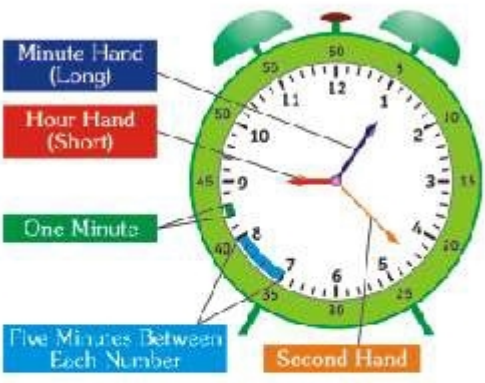
These ratios can be written in the form  $\frac{2}{4} = \frac{1}{2}$  or  $\frac{3}{6} = \frac{1}{2}$ .

2 : 4 :: 1 : 2 or 3 : 6 :: 1 : 2 is called a proportion.

U. Charts, Time

# Time

UNDERSTANDING MATHS



**: TIME PERIODS :**

60 SECONDS	in each	MINUTE
60 MINUTES	in each	HOUR
24 HOURS	in each	DAY
7 DAYS	in each	WEEK
4 WEEKS	in each	MONTH
12 MONTHS	in each	YEAR
100 YEARS	in each	CENTURY
1000 YEARS	in each	MILLENNIUM

<p><b>O' Clock</b></p> <p>6:00</p> <p>Morning Time</p>	<p><b>Quarter Past</b></p> <p>7:15</p> <p>School Time</p>	<p><b>Half Past</b></p> <p>1:30</p> <p>Lunch Time</p>	<p><b>Quarter To</b></p> <p>10:45</p> <p>Sleeping Time</p>
--	---	---	--

## What's The Time



Converting  
**12**  
Hour Clock  
to  
**24**  
Hour Clock

12 Midnight to 12 Noon (a.m.)	
0000 hrs = 12 Midnight	0600 hrs = 6 a.m.
0100 hrs = 1 a.m.	0700 hrs = 7 a.m.
0200 hrs = 2 a.m.	0800 hrs = 8 a.m.
0300 hrs = 3 a.m.	0900 hrs = 9 a.m.
0400 hrs = 4 a.m.	1000 hrs = 10 a.m.
0500 hrs = 5 a.m.	1100 hrs = 11 a.m.
12 Noon to 12 Midnight (p.m.)	
1200 hrs = 12 Noon	1800 hrs = 6 p.m.
1300 hrs = 1 p.m.	1900 hrs = 7 p.m.
1400 hrs = 2 p.m.	2000 hrs = 8 p.m.
1500 hrs = 3 p.m.	2100 hrs = 9 p.m.
1600 hrs = 4 p.m.	2200 hrs = 10 p.m.
1700 hrs = 5 p.m.	2300 hrs = 11 p.m.

## Disclaimer

The Products details given on this page are indicative in nature and JAPSON reserves the right to change them without prior notice. Buyer is also requested to re-check the specifications and other features of product at the time of order as product development is a continuous process and minor modifications may

be made to design based on latest availability, process and design.