

# Stages of the physiological child development

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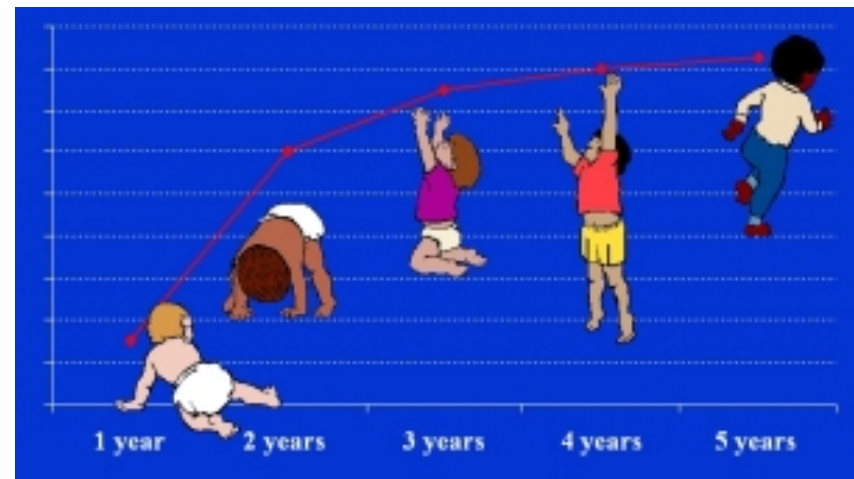
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# Principles of development

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1. Development is a continuous process from conception to maturity. Children learn skills, called developmental milestones, during predictable time periods.
2. Sequence of development is same pattern in all children but rate varies.
3. Development is intimately related to maturation of nervous system- opportunity to practice.
4. Generalized mass activity replaced by specific individual response.



# Development monitoring

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The main objective of assessing a young child's development is the early detection of delayed or abnormal development in order to:

1. Help children achieve their maximum potential
2. Provide treatment or therapy promptly  
(particularly important for impairment of hearing, vision and motor skills)
3. Act as an entry point for the care and management of the child with special needs

Development in the first years of life is monitored

- by parents
- by doctor during a regular child health surveillance checks  
(i.e. vaccination, screening visits)
- during visit in health care facility

# Developmental screening and assessment

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- Developmental screening – checks of whole populations or groups of children at set ages by trained professionals
- Developmental assessment – detailed analysis of overall development or specific areas of development

# Milestones

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1. Developmental norms are called **milestones** - they define the recognized **pattern** of development that children are expected to follow.
2. Developmental milestones serve as the **basis of most standardized assessment and screening tools**.
3. Each child develops in a unique way. However using norms helps in understanding these general patterns of development while recognizing the wide variation between individuals.
4. Normal development implies steady progress in all four developmental fields with acquisition of skills occurring before limit ages are reached.

# Milestones

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Developmental monitoring should be aimed at:

- identifying children who have low function
- directing the focus of anticipatory guidance to help promote normal development

In order to screen a young child's development, it is necessary to know only a **limited number** of key developmental milestones and their limit ages.

Two separate developmental assessment over time are more predictive than a single one.

If there is developmental delay, it can affect all four developmental fields - global delay, or one or more developmental field only - specific developmental delay.

# Assessing child development

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## Assessment criteria:

- Developmental milestones- the acquisition of important developmental skills
- Median age – when half the population acquire a skill; serves as a guide to normal pattern of development
- Limit age – when a skill should have been acquired; further assessment is indicated if not achieved

## When evaluating a child's development, consider:

- the sequence of developmental progress
- the stage the child has reached for each skill field
- if progress is similar in each skill field
- how the child's developmental achievements relate to age

# When to suspect abnormalities of development

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## Child health history:

- Interview from parents (75-80% sensitivity to childhood disability and 70-80 % specificity for normal development)
- Information from examination:
  - During routine examination - developmental screening
  - Follow up examination in high risk children



# Risk factors

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Risk factors for likelihood of developmental impairment:

- Prenatal (use of drugs or alcohol, TORCH infection)
- Perinatal factors (prematurity, LBW, obstetric complications)
- Neonatal factors (neonatal encephalopathy, infections like sepsis or meningitis and severe hyperbilirubinemia)
- Post natal factors (injury or meningitis, encephalitis, exposure to toxins, severe continuous failure to thrive, severe epilepsy)
- Family history

# Four fields of child development

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Sits unsupported  
Walks with assistance  
Walks unaided

**Gross motor-  
initial area**

**Vision  
Fine motor  
skills**

Follows a face  
Reaches a toys  
Grasps with palmar grip  
Picks up toys

Startled loud noises  
Coos and babbles  
Turns head to sounds  
Say "mama, dadada"  
Understands commands  
Say words  
Talk sentences

**Hearing, speech  
and language**

**Psychical  
development:  
social, emotional  
and behavioral**

Smiles  
Feed himself solid food  
Drinks from a cup  
Try to dress himself  
Toilet- trained



# Gross Motor Development

# Head control

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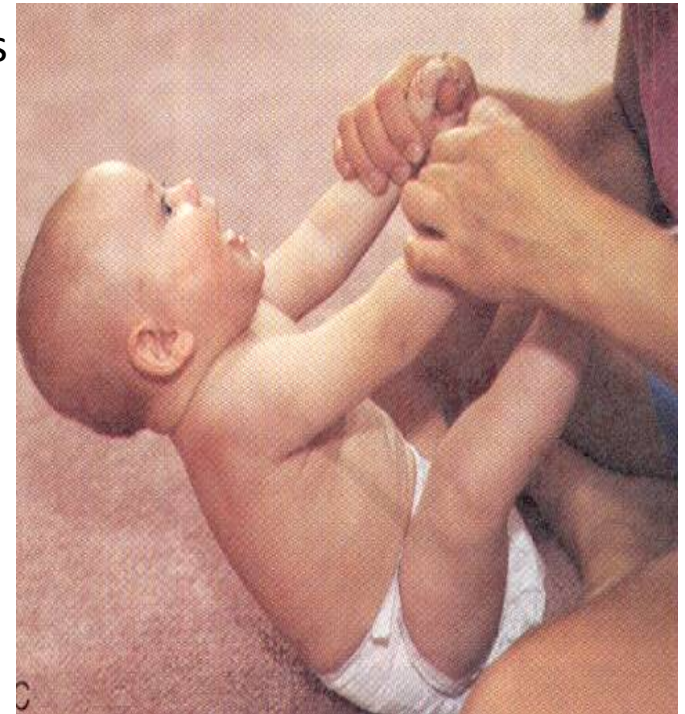
Newborn: barely able to lift head

6 months: easily lifts head, chest and upper abdomen and can bear weight on arms



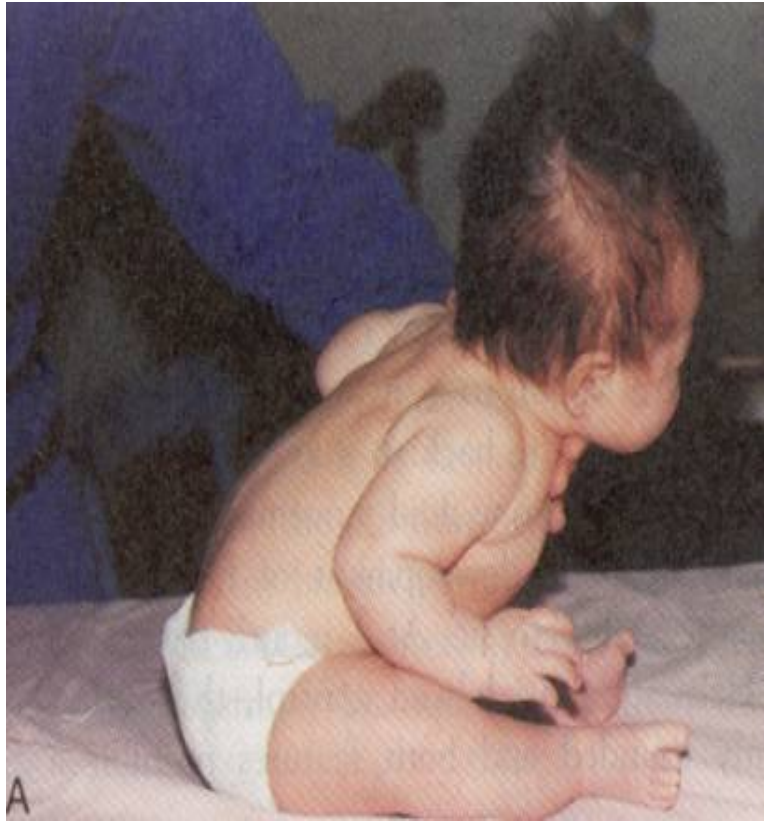
Newborn

6 months



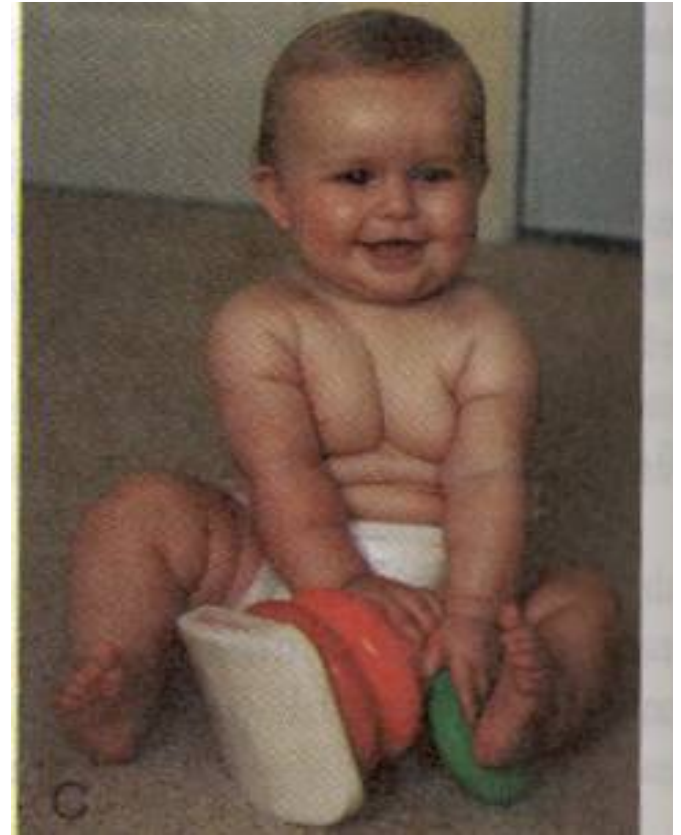
# Sitting Up

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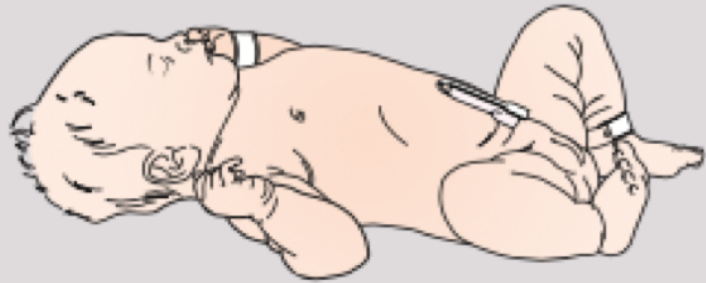


Age 2 months

Age 8 months

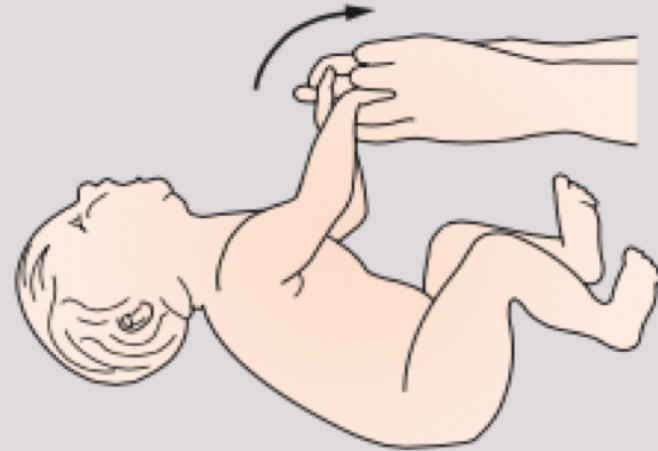


**newborn**



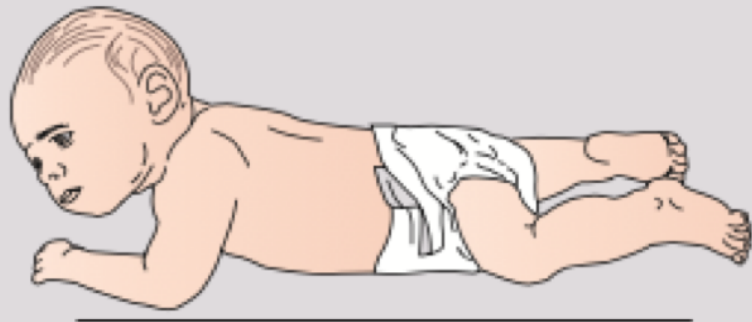
Limbs flexed, symmetrical posture

**newborn**



Marked head lag on pulling up

**6–8 weeks**



Raises head to 45° in prone

**6–8 months**



Sits without support

– at 6 months: with round back

– at 8 months: with straight back (shown)

# Ambulation

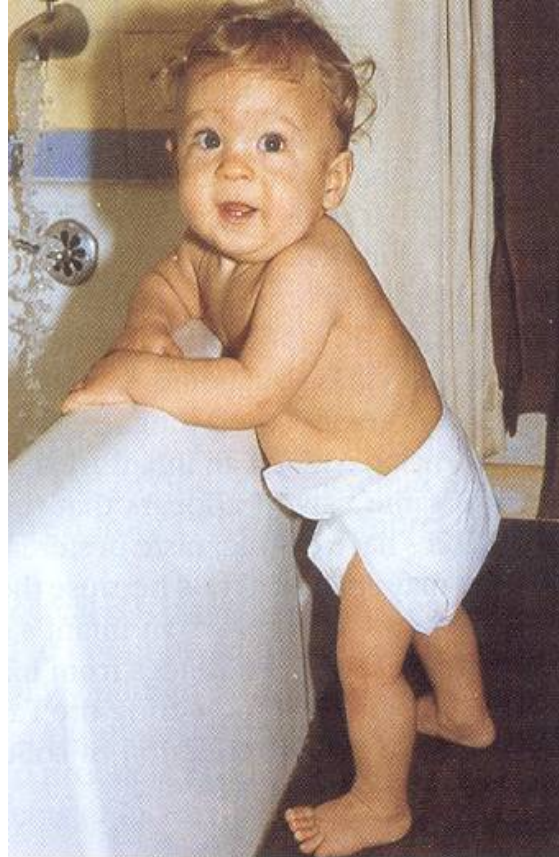
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9 month old: crawl

1 year: stand independently from a  
crawl position

13 month old: walk and toddle quickly

15 month old: can run

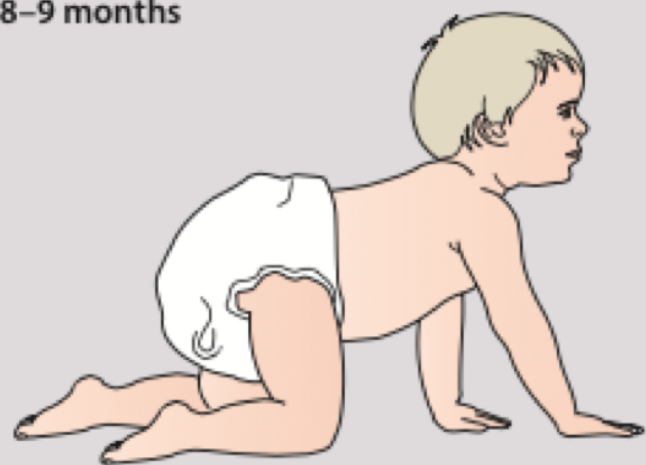


9-12-months



13 month old

8-9 months



Crawling

10 months



Cruises around furniture

12 months



Walks unsteadily,  
broad gait, hands apart

15 months



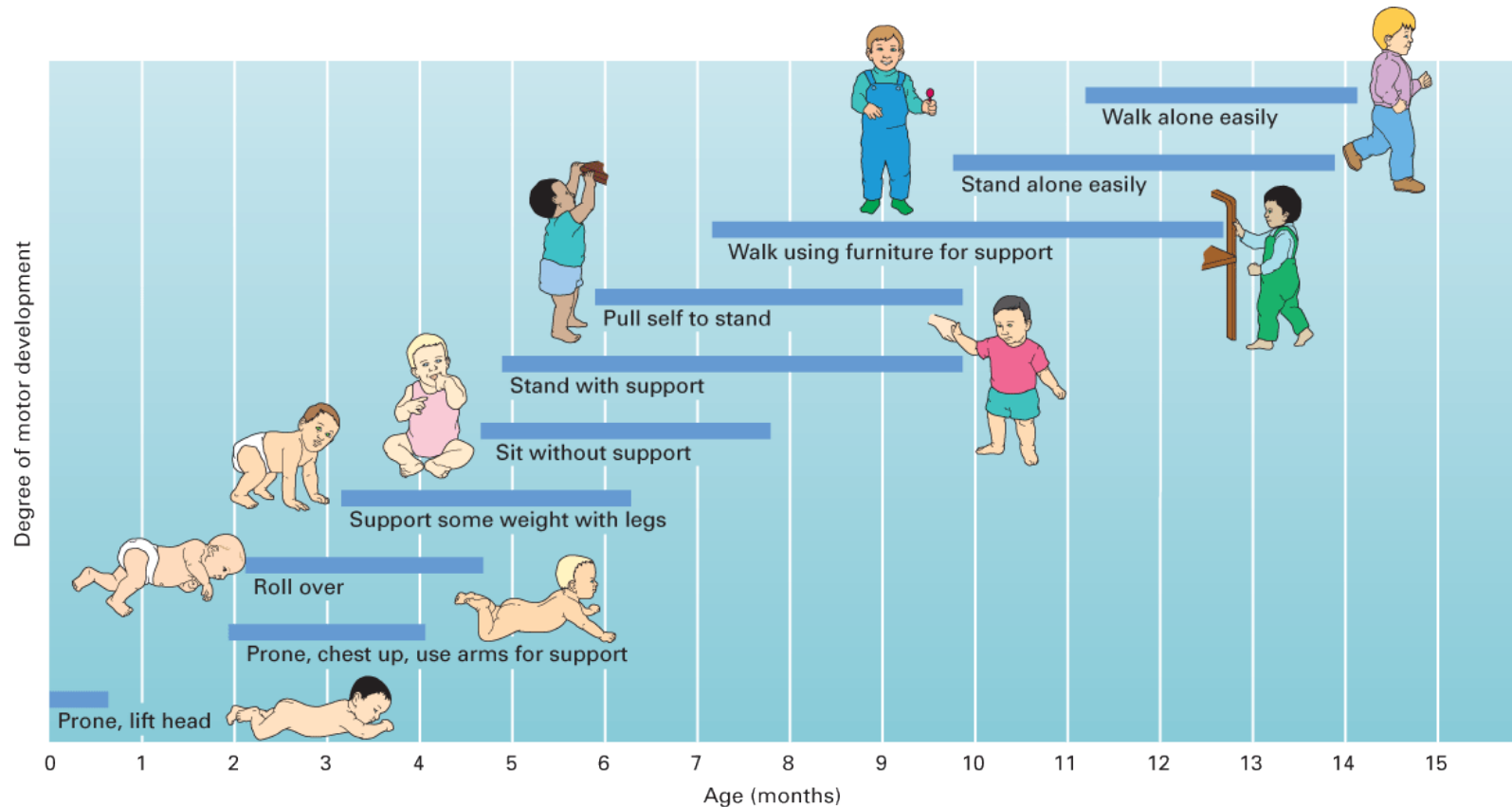
Walks steadily



# Primitive reflexes

Primitive reflexes	Integrated
<b>Moro</b> - sudden extension of the head causes symmetrical extension, then flexion of the arms	6 mo
<b>Grasp</b> - flexion of the fingers when an object is placed in the palm/ on the plantar part of foot	Palm - 3 mo Plantar - 8 mo
<b>Rooting</b> - heads turns to the stimulus when touched near the mouth	3-4 mo
<b>Stepping response</b> - stepping movements when held of feet vertically and dorsum of feet touch a surface	Prior walking
<b>Asymmetrical tonic neck reflex</b> - lying supine, the infant adopts an outstretched arm to the side to which head is turned	6-7 mo

# Milestones in Gross Motor Development



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# Vision & Fine Motor Development

# Fine Motor Development

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6-month-old



12-month-old

6 weeks



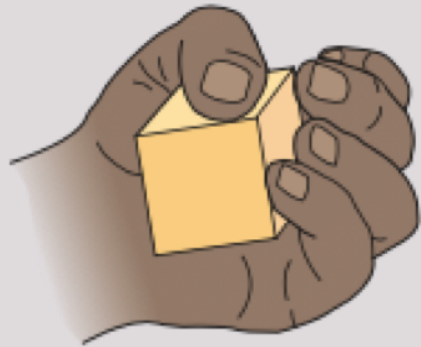
Follows moving object or face by turning the head (illustrated).

4 months



Reaches out for toys

4-6 months



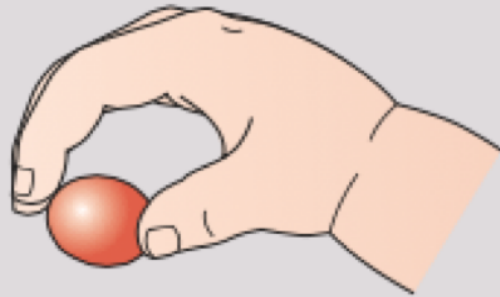
Palmar grasp

7 months



Transfers toys from one hand to another

10 months



Mature pincer grip

16–18 months



Makes marks with a crayon

14 months–4 years



Tower of three  
(18 months)



Tower of six  
(2 years)



Tower of eight or  
a train with four bricks  
(2½ years)



Bridge (from a  
model) 3 years



Steps (after  
demonstration) 4 years

2–5 years



Line (2 years)



Circle (3 years)



Cross (3½ years)



Square (4 years)



Triangle (5 years)

Ability to draw without seeing how it is done.  
Can copy (draw after seeing it done) 6 months  
earlier.

# Fine Motor Development

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Newborn has very little control. Objects will be involuntarily grasped and dropped without notice.

6 month old: palmar grasp – uses entire hand to pick up an object

9 month old: pincer grasp – can grasp small objects using thumb and forefinger



Palmar



Pincer

# Fine Motor Development

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## Age 7

- Hands used more as 'tools,'

## Age 8-10

- More independent with hands
- Fine motor skills develop

## Age 10-12 (end of elementary school)

- Manipulative skills like adults





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# Hearing, Speech & Language

# Hearing Development

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- BAER hearing test (brainstem auditory evoked response) done at birth
- Ability to hear correlates with ability pronounce words properly
- History of otitis media – ear infection

**NEWBORN**



Startles to loud noises

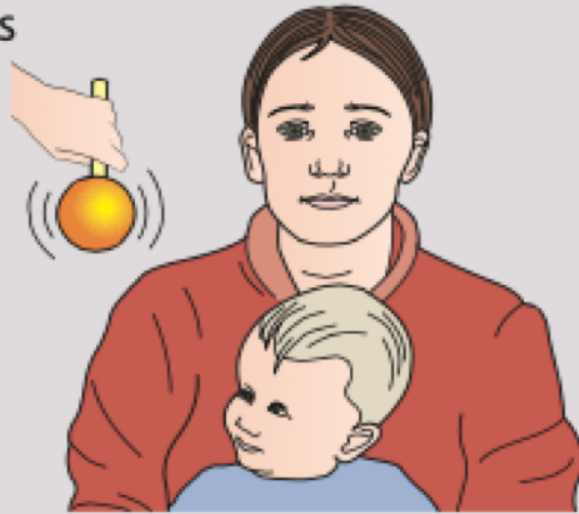
**3-4 MONTHS**



Vocalises alone or when spoken to, coos and laughs

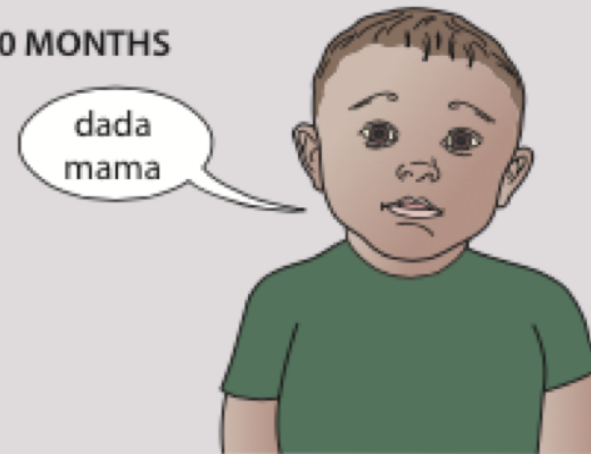
(b)

**7 MONTHS**



Turns to soft sounds out of sight

**7-10 MONTHS**



At 7 months, sounds used indiscriminately.  
At 10 months, sounds used discriminately to parents

(d)

12 MONTHS



Two to three words other than 'dada' or 'mama'

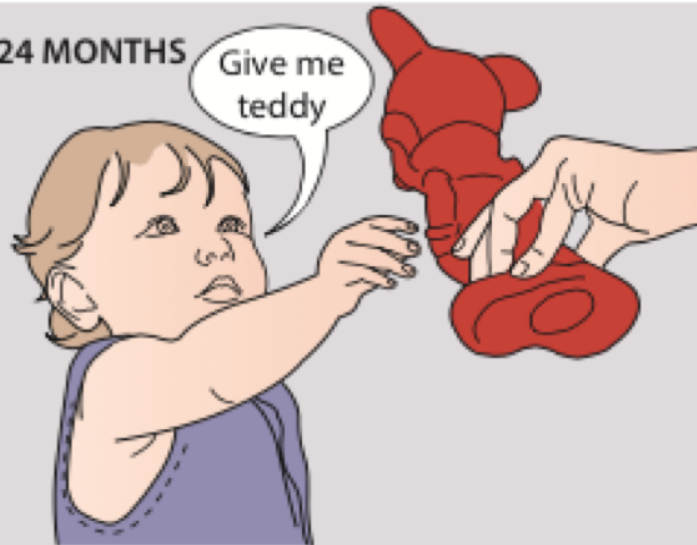
18 MONTHS



6–10 words. Shows two parts of the body

(f)

20–24 MONTHS



Uses two or more words to make simple phrases

2<sup>1</sup>/<sub>2</sub>–3 YEARS



Talks constantly in 3–4 word sentences

(h)

## Language, Speech milestones

Age	Milestone
1 months	Alerts to sound
3 months	Coos
4 months	Laugh loud
6 months	Monosyllables
9 months	Bisyllables
12 months	1-2 words with meaning
18 months	8-10 words vocabulary
2 years	2-3 words sentence, use pronouns "I", "me", "you"
3 years	Ask questions; knows full name and gender
4 years	Says song or poem; tells stories
5 years	Asks meaning of words



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# Social, Emotional & Behavioural Development

6 WEEKS



Smiles responsively

6-8 MONTHS



Puts food in mouth

10-12 MONTHS



Waves bye-bye, plays peek-a-boo

12 MONTHS



Drinks from a cup  
with two hands

18 MONTHS



Holds spoon and gets food safely to mouth

18-24 MONTHS



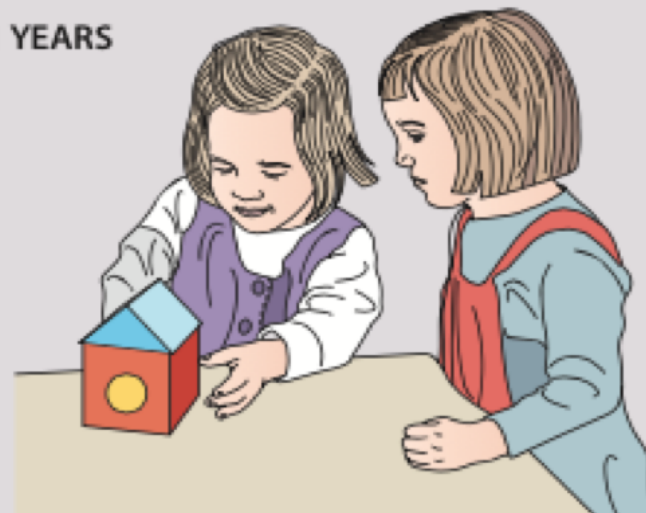
Symbolic play

2 YEARS



Dry by day.  
Pulls off some  
clothing

2.5-3 YEARS



Parallel play. Interactive play evolving. Takes turn



Social and adaptive milestones	
Age	Milestones
2 months	Social smile
3 months	Recognizes mother; anticipates feeds
6 months	Recognizes strange/ stranger anxiety
9 months	Waves 'bye-bye'
12 months	Comes when called; plays simple ball game
15 months	Jargon
18 months	Copies parents in task
2 years	Asks for food, drink, toilet; pulls people to show toys
3 years	Shares toys; knows full name and gender
4 years	Plays cooperatively in a group; goes to toilet alone
5 years	Helps in household tasks; dresses and undresses



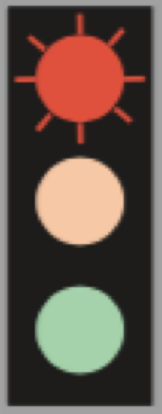
# Fields of development with limit ages

## Gross motor development



- Acquisition of tone and head control
- Primitive reflexes disappear
- Sitting
- Locomotor patterns
- Standing, walking, running
- Hopping, jumping, peddling

Gross motor	Limit ages
Head control	4 months
Sits unsupported	9 months
Stands independently	12 months
Walks independently	18 months

A traffic light icon with three colored circles: red at the top, orange in the middle, and green at the bottom.

# Vision & fine motor development

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## Vision and fine motor development



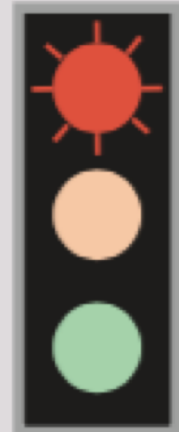
- Visual alertness, fixing and following
- Grasp reflex, hand regard
- Voluntary grasping, pincer, points
- Handles objects with both hands, transfers from hand to hand
- Writing, cutting, dressing

## Vision and fine motor

## Limit ages

Fixes and follows visually  
Reaches for objects  
Transfers  
Pincer grip

3 months  
6 months  
9 months  
12 months



# Hearing, speech & language development


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**Hearing, speech and language development**



- Sound recognition, vocalisation
- Babbling
- Single words, understands simple requests
- Joining words, phrases
- Simple and complex conversation

Hearing, speech and language	Limit ages
Polysyllabic babble	7 months
Consonant babble	10 months
Saying 6 words with meaning	18 months
Joins words	2 years
3-word sentences	2.5 years



# Social, emotional & behavior development

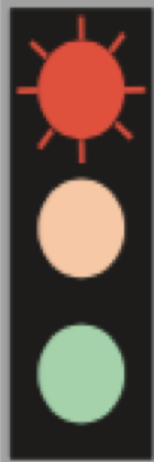
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**Social, emotional, behaviour development**



- Smiling, socially responsive
- Separation anxiety
- Self-help skills, feeding, dressing, toileting
- Peer group relationships
- Symbolic play
- Social/communication behaviour

Social behaviour	Limit ages
Smiles	8 weeks
Fear of strangers	10 months
Feeds self/spoon	18 months
Symbolic play	2–2.5 years
Interactive play	3–3.5 years



# Red Flags: 4 to 6 months

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- Poor head control
  - Evaluate for hypotonia
- Failure to reach for objects by 5 months
  - Evaluate for motor, visual or cognitive deficits
- Absent Smile
  - Evaluate for visual loss
  - Evaluate for attachment problems
  - Consider child abuse or child neglect in severe cases



# Red Flags: 6 to 12 months

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- Persistence of primitive reflexes after 6 months
  - Evaluate for neuromuscular disorder
- Absent babbling by 6 months
  - Evaluate for hearing deficit
- Absent stranger anxiety by 7 months
  - May be related to multiple care providers
- Inability to localize sound by 10 months
  - Evaluate for unilateral hearing loss

# Red Flags: 12 to 24 months

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- Lack of consonant production by 15 months
  - Evaluate for hearing loss
- Lack of imitation by 16 months
  - Evaluate for hearing deficit
  - Evaluate for cognitive or socialization deficit
- Hand dominance prior to 18 months
  - May indicate contralateral weakness with hemiparesis
- Inability to walk up and down stairs at 24 months
  - May lack opportunity rather than motor deficit



# Red Flags: 12 to 24 months

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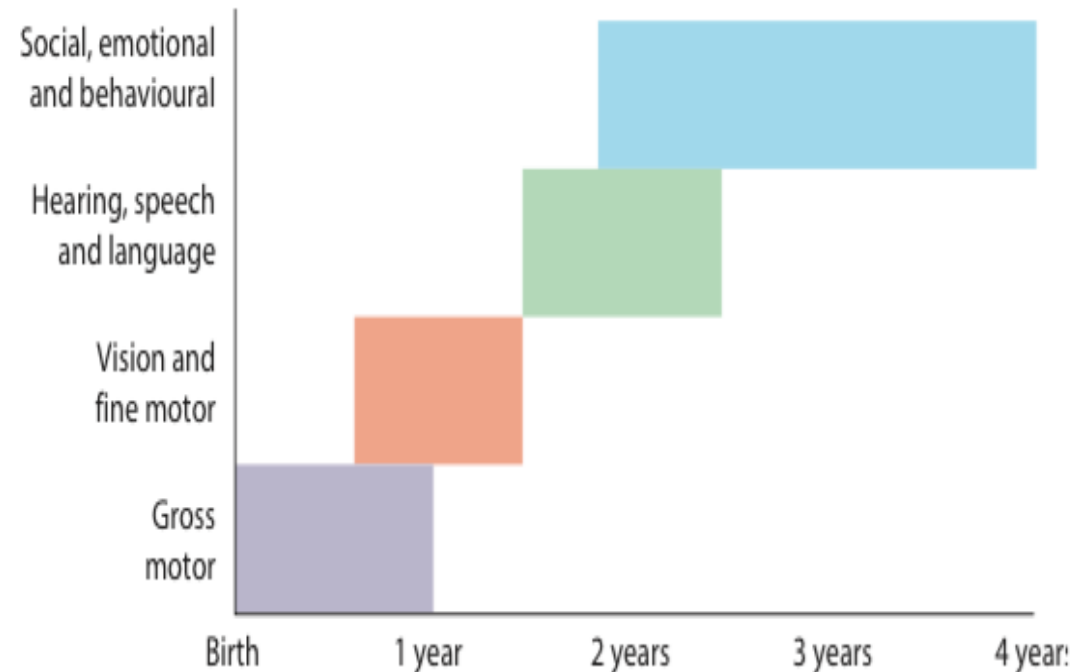


- Advanced non-communicative speech (e.g. echolalia)
  - Simple commands not understood suggests abnormality
  - Evaluate for autism
  - Evaluate for pervasive developmental disorder
- Delayed Language Development
  - Requires hearing loss evaluation in all children

# Short-cut Approach

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- 1. Gross motor** - explosion of skills during 1st year of life
- 2. Vision & fine motor** - evident acquisition of skills from 1 year onwards
- 3. Hearing, speech & language** - expansion of skills from 18 months
- 4. Social, emotional & behavioural** - evidently obvious from 2.5 years



# Developmental milestones by median age

Age	Gross Motor	Visioon&Fine Motor	Hearing, Speech&Language	Social, emotional&behavioural
Newborn	Flexed posture	Fixes and follows face	Stills to voice Startles to loud noise	Smiles by 6 weeks
7 months	Sits without support	Transfer objects from hand to hand	Turns to voice, Polysyllabic babble	Finger feeds Fears strangers
12 months	Stands independently	Pincer grip (10 months), Points	1 -2 words Understand name	Drinks from the cup Waves
15-18 months	Walks independently	Immature grip of pencil, Random scribble	6 -10 words Points to four body parts	Feeds self with a spoon Beginning to help with dressing
2 ½ years	Runs and jumps	Draws	3 -4 word sentences Understands two joined commands	Parallel play Clean and dry

# References and sources

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